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ABSTRACT

Prepared for the National Science Foundation (NSF), this report summarizes the development and work of the Outdoor Biology Instructional Strategies (OBIS) project from 1972 to 1979. One hundred activities for ten- to fifteen-year-olds in community groups (scouts, clubs, camps, churches, etc.) were developed, field tested, revised, and made available to the public. The intent of the materials was to increase the environmental awareness, knowledge, and management skills of future decision makers by teaching about major biological concepts and ecological interactions in an informal educational setting. Special characteristics of the program include a national scope within regional and local diversity, flexible use patterns, "leaderproof" activities, multidisciplinary approach, and grassroots involvement. This report outlines, phase by phase, the procedures used in developing OBIS and offers a model useful to other curriculum developers interested in producing attractive, community-based materials. It discusses the folios, field and resource centers, community involvement, activity production, instructional strategies, domestic and international adaptations, and commercial production (1979-1981). (SK)

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FINAL PROJECT REPORT

OUTDOOR BIOLOGY INSTRUCTIONAL STRATEGIES (OBIS): 1972-79

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Section I

OVERVIEW OF OBIS

Introduction

The *Outdoor Biology Instructional Strategies* (OBIS) Project was funded by the National Science Foundation from 1972 to 1979 to develop innovative outdoor biology activities for use by ten- to fifteen-year-olds in community groups such as Boy Scouts, Girl Scouts, Campfire Girls, 4-H Clubs, summer camp programs, national and regional park programs, and by families in their own backyards. In reality, OBIS proved to be equally effective with persons aged six to adult in both community and school environments. Since 1972, OBIS has been used by about 250,000 adults and over 6½ million young people in the U.S. and abroad. With the total funding for development at $1,464,500, this results in a development-per-user cost of approximately 22¢.

A total of 100 outdoor biology activities were developed by the OBIS staff. The unique qualities of the OBIS approach to activities was a true reflection of the diversity of backgrounds and expertise of the staff. During the development of OBIS, 52 persons contributed in some way to the evolution of this unique approach to informal science education. Probably the most important factor in the evolution of the instructive "OBIS approach" was the staff's preference to allow their approach to evolve from their interactions with community groups, rather than to develop materials using preconceived notions of what kind of curriculum these groups needed. OBIS evolved through a cooperative and constructive effort by the staff and various community groups eager to define the parameters of education in this largely recreational environment.

As activities were developed and tested by community groups, the staff gained an even clearer understanding of the factors governing education in community group settings. Furthermore, the community groups provided valuable feedback for the staff on how to "fine-tune" and otherwise improve the OBIS format, instructional techniques, and organizational framework and to make OBIS more compatible with the realities of community activities.

The relationshiop between the staff and community groups grew closer as development progressed as was evidenced by the extent to which community groups supported and promoted OBIS on their own initiative and - most often - at their own expense. Of the approximately 650 informational and leadership training workshops conducted from 1973 to 1980, nearly half were initiated by community groups and volunteer Resource Centers in 38 states. There is no doubt that the OBIS Project responded to a definite need; the overwhelming commitment of major community groups to OBIS confirms the timeliness of its development.

Meeting a Need

There are few who would dispute the urgent need for man to increase his knowledge about the environment in order to preserve our quality of life and to ensure that an informed public will demand that sound environmental policies are adopted at the local, state, national, and (we hope) even at the international level.

Whether the public is prepared or not, it is being thrust into a decision-making role about environmental issues at the ballot box; many of these issues have ramifications over the long run that must be seriously debated and the alternatives carefully weighed. These tasks require that the public be well informed and able to apply basic biological concepts and processes to an issue if it is to judge its merits.

The OBIS staff believed that the public - generally with little or no scientific background - needed a means of grasping key biological concepts as well as the delicate, complex series of interactions that characterize our ecosystem. The best level of conveying technical information to a lay audience, studies indicate, is at the age level of 10- to 15-year olds.

This group, moreover, was a highly desirable target audience for OBIS, because young people at this age are capable of grasping the subject matter and are also eager for information with which to form attitudes and express their ideas on issues. The staff believed that OBIS should first consider influencing the coming generations of "environmental managers" with sound attitudes and management skills; attitudes and skills that would, it was hoped, continue with them through adult life. Since materials written for this age group are also suitable for adults, this latter group represented a secondary target audience that, in retrospect, proved to be anything but secondary.

Although the need was obvious, the approach for successfully meeting the challenge of increasing science literacy and awareness in the community rather than the classroom presented a number of distinctive challenges to the OBIS staff.

Meeting the Challenge.

The desire of the OBIS staff to explore the community group and other informal educational settings was motivated in part by the realization that to date science instruction has not fared well in the classroom. This was all the more true of *outdoor* biology which is *not* treated in most schools and is not even incorporated into *field* trips by teachers!

Environmental groups certainly conduct outdoor biology activities with their groups; however, a survey of the types of outdoor biology activities conducted by these groups indicated that they were predominantly concerned with camping and nature walks in the virgin wilderness. Few programs focused on the need for young people to become knowledgeable about man-managed environments in which most people live, work, and recreate.

To understand and assess man's impact on the environment, the OBIS staff reasoned, it was essential to scrutinize those environments in which nature and man "overlap". Rather than heading for the pristine wilderness to get its message across the OBIS staff had to "take to the streets," to the vacant city lots, urban parks, and backyards of urban and suburban America where students could study man's management of the environment and his impact on it. This unusual focal point for the OBIS Project posed certain challenges for the staff:

National Scope Within Regional and Local Diversity: While OBIS was designed to have national exposure and impact on environmental education, the staff also had to insure that activities reflected the diverse regional and local man-managed environments community groups were likely to find if OBIS were to be used nationwide.

Flexible Use Patterns: Given the diversity of community groups that exist, the diverse audiences they serve, and the multitude of programs and events they sponsor, the OBIS staff realized the importance of making OBIS activities flexible enough in format, sequencing, and content to be easily incorporated into various types of events.

"Leaderproof" Activities: In order to insure the widest use of OBIS activities, the OBIS staff designed the format and content in such a way that a community group leader with no background in science and without any training in the use of OBIS materials could lead an OBIS activity comfortably as "one of the group" and not be placed in the position of playing "science expert" who is expected to have all the answers.

Multidisciplinary Entrance & Exit Points: In order to mesh OBIS activities with existing community group activities, the OBIS staff combined science with complementary disciplines such as mathematics, crafts, language skills, game simulations, and puzzles in order to increase the likelihood that OBIS would be viewed as a relevant activity and incorporated into a larger community program because of this connection. Furthermore, the staff also provided for OBIS activities to be used individually or in flexibly structured series of varying lengths for more detailed treatments of a concept, investigative technique, or environment. This made OBIS an attractive activity for use in the free-choice recreational settings of many community groups in which rigidly sequenced and structured curricula were unsuitable.

Grass Roots Testing & Feedback: The staff needed to develop a new procedure for developing activities that was truly responsive to the needs of diverse types of groups during the development phase so that revisions could be made prior to publication.

These elements in the OBIS design plan were unlike those found in previous environmental education efforts, including *The Environmental Studies Project (ESP), Audubon Ecology Program's* "A Place To Live," and *Merril Science Skillcard Set's* "Investigation in Ecology." OBIS, unlike previous programs, adapted to the diversity and needs of community groups in a free-choice, recreational setting.

The Impact of OBIS

The staff was gratified by the high level of interest among community groups in using OBIS as well as in disseminating information about the program to others. This was, after all, the acid test of the OBIS approach to informal, community-centered environmental education. Nevertheless, the impact of OBIS has been measured in a variety of other ways, too.

In the area of curriculum design, OBIS has provided development specialists with an effective process of activity prototype-test-feedback-test-feedback-production. This can be used in a variety of curriculum projects in which staff need feedback on performance prior to production and formal testing with target audiences.

OBIS also pioneered some new techniques for making educational materials more attractive to community groups and more easily integrated into their existing programs. Linking science activities with crafts, hobbies, and game simulations; approaching activity development from the user group's orientation; and allowing for use of individual or flexibly sequenced series of activities were a few of these innovations.

Finally, OBIS has had a substantial impact on people; or at least an impact on a substantial number of people, millions of them. Well over 250,000 adults and 6½ million young people have used OBIS. Many of these users have actively disseminated information about OBIS on their own initiative; some have establish OBIS Resource Centers with their own funds to provide workshops and seminars for educators, community groups leaders, and the general public. OBIS activities are currently being used by schools and community groups in all 50 states, the District of Columbia, U.S. possesions, and in many countries around the world.

OBIS is used from the Indian Subcontinent to the South Pacific. Some users have translated activities verbatim (e.g. Europe and Scandinavia); while Israeli educators adapated 20 OBIS activities to the organisms and terrain of the Negev Region of Israel for a Hebrew-language edition of OBIS.

The OBIS staff itself has benefitted immeasurably from this opportunity to translate innovative but "rough" ideas into a fine-tuned program. The techniques the staff evolved as the result of working together with community groups have proved infinitely adaptable to other projects developed at the Lawrence Hall. This "OBIS-ization" of other projects only serves to enhance the overall impact OBIS will have on activity-centered science curricula in the 1980's and beyond.

This "Final Report" will attempt to highlight the evolution and experiences of the OBIS Project, because both are rich in information - positive and negative - that may be of value to other curriculum development specialists. But the end of this curriculum development project is really only a beginning for OBIS as a commercially published, community-oriented program. The "Final Report" can only hint at the continuing role OBIS is likely to play in raising man's awareness of the environment he manages and ways in which educators can reach the public through "the community group connection."

The OBIS staff would like to take this opportunity to express its deep gratitude to the Field/Resource Center personnel and the scores of community groups whose long-term voluntary support of OBIS made it a highly effective, pioneering effort in community-oriented education.

They conducted a total of more than 450 workshops in 28 states and four U.S. Territories as one indication of their commitment to OBIS. They also provided valuable feedback on field-tests of activities and otherwise assisted the staff to get a firm grasp of this completely new educational environment called "the community."

The staff is also grateful to the National Science Foundation for supporting the development of this innovative approach to informal science education. The report that follows, we believe, verifies the wisdom of designing science programs to tap the potential of this educational setting in the coming decade. The fact that OBIS has led the way into this new educational frontier in the 1970's is just another indication that OBIS was ahead of its time in more ways than one.

W. M. Laetsch
Principal Investigator

Berkeley, California
May, 1981.

Section II

EVOLUTION OF THE FOLIO (1972-74)

Introduction

In one sense, the evolution of the "folio" format during the early developmental stage of the Project represents one major exploratory phase of OBIS during which many instructional techniques, formats, and learning tools were tested and evaluated. This phase, moreover, is one which not only sheds light on the techniques and approaches examined by the staff, but also the field-test/revision process developed by the OBIS staff that was instrumental in the production of materials that could meet the needs of highly diverse user groups around the country and the world.

The Lawn and *The Pond:* Organizing Environments by "Unit." During the first project year, 1972-73, the OBIS staff developed two units of investigations focusing on two common environments: the lawn and the pond. The units contained 9 and 12 activities, respectively. Each unit provided description of activity procedures and background science information for the group leader. *The Lawn* Unit also featured a glossary of technical terms.

Rationale: The rationale for organizing series of activities around environmental "units" was to provide the staff with an opportunity to compare the effects of various strategies on the same individuals over the course of a unit.

Among the instructional strategies incorporated into the *Lawn* and *Pond* Units were the following:

1. *Audio cassettes* to arouse interest and guide activities.
2. *Mapping techniques* to define investigation site and promote discussion of evidence.
3. *Controlled experiments* to study the impact of a single factor on an experiment.

4. *Sampling techniques* to determine population variety and distribution.
5. *Simulation games/activities* to make environmental interactions more vivid and memorable for participants.
6. *Guest speakers* to relate the group's activities to large issues and concerns about the environment.
7. *Equipment construction by participants* to increase their personal involvement in the investigations.
8. *Different but related environments* to contrast ecological principles.

Another rationale for this organization was an assumption by the staff that groups using these units would be able to meet at least once a week for a period of 2-3 months to complete a given unit. Since the staff believed that most group leaders using these materials would have little or no prior background in science, the sequence of activities was designed as a self-contained introduction to the organisms, interactions, and habitats of a given environment. The focus on common, local environments also enabled local groups to apply their observations and investigations of a local environment to larger national and global "environments."

Field-Test Data: The first version of *The Lawn* and *The Pond* were field-tested with approximately 100 young people in both school and nonschool groups during the spring and summer, 1973. Based on the feedback of these preliminary field tests, modified versions of these two units were tested during fall, 1973, by 26 teachers and community group leaders. Following an informational session at the Lawrence Hall of Science, these leaders used the OBIS units with about 1,500 nine-to fourteen-year-olds. Test sites included local school grounds, parks, and pond and lawn areas reached by short hikes or, in some instances, by bus.

Evaluation Results: Evaluation collected for each activity used by the groups included: (1) OBIS staff observer reports; (2) group leader feedback forms; (3) student "unit opinion forms" ; and (4) follow-up activities to assess student understanding of environmental concepts introduced through the OBIS activities.

Based on this feedback, the OBIS staff came to the following conclusions regarding the "unit" organization for environmental investigations:

1. While the "unit" approach conveyed information about a given type of environment in isolation, it did not enable participants to grasp the dynamic and diverse interactions among environments and their interrelationships with man. Given the complex nature of cause-and-effect relationships emerging from an increasingly man-managed environment, the staff felt that studying environments in isolation would not adequately inform participants about the ramifications of man's actions.

2. Few school or community groups were either willing or able to devote two to three months to the study of a single environment. The self-contained structure of the "unit," moreover, did not provide the group leader with sufficient flexibility in selecting activities that complemented other group activities, activity sites, special events, and short-term educational programs.

3. The staff also found that organizing activities into fixed sequences solely "by environment" (i.e. terrestrial, aquatic) reduced the program's flexibility. As a result, community group leaders experienced some difficulty incorporating OBIS activities into many of the diverse programs and events sponsored by the community group. In some instances, time constraints made the use of OBIS infeasible. In others, the activity site was not suitable for the OBIS unit under investigation, or the concepts treated by the OBIS activities did not coincide with those of the group activity.

Community Group Leaders Conference: A Pivotal Point.

Feedback from group leaders and students participating in field tests was predominantly positive and enthusiastic. Their candid remarks were extremely useful for the staff in their attempt to heighten the flexibility and utility of OBIS for community and school group use. Subsequent discussions with field test participants led to a formal "Community Group Survey" sent to major community groups in the Greater San Francisco Bay Area in order to determine how to best meet the needs of these groups for flexible, informal environmental education.

Groups contacted by the OBIS staff included Scout Troops, 4-H Clubs, community centers, museums, local and regional park programs, science centers, summer camps, and nature centers. The diversity of conditions described by community group leaders surveyed by OBIS confirmed the need for OBIS activities to be structured more flexibly to meet the diverse needs of community groups nationwide. On the survey form and during the follow-up phone interviews conducted by the OBIS staff, community group leaders expressed a great deal of interest in finding out more about the OBIS Project. The result was an informational conference held at the Lawrence Hall of Science on January 25, 1974. Attendees included Boy Scout and Girl Scout Troops, 4-H Clubs, nature and science centers directors, summer camp leaders, coordinators of state and regional park programs, and church group representatives.

During the course of the conference, community group leaders described the varied circumstances under which they operate and what kind of environmental education materials they desired; as the following descriptions indicate, a full spectrum of needs was represented.

Single Activities vs. Activity Sequence: Nature center programs, community-organized field trips, and Scout outings could better incorporate single-session, stand-alone environmental activities that will meet the site requirements and time constraints of 1-day programs. On the other hand, leaders of community-sponsored programs and summer camps indicated a need for intensive, multiple-session programs to focus on a particular concept or aspect of environmental education.

Leadership Training vs. Self Training: Numerous groups expressed the desire for formal training of their group leaders prior to using OBIS biology activities the first time. They felt that this training would be essential to successfully adapt these activities to their programs. However, other community groups at the conference indicated a preference for activities that leaders with no background in science and without prior training could effectively incorporate into group programs, outings, and events.

Equipment: Purchase vs. Construction: Budgetary concerns of many groups were reflected in their preference for constructing their own equipment to be used with print materials purchased from OBIS. This minimizes costs for user groups and - as OBIS staff pointed out - increases participant interest and involvement in the activity.

The information obtained from community group representatives at the conference enabled the OBIS staff to identify a few general characteristics that OBIS would need in order to meet the needs of school and community groups.

First, a flexible structure would be required for OBIS so that groups could schedule activities individually or in sequence by environment, concept, or instructional technique. OBIS must be adaptable to the programs and events of the community group.

Second, while prior training in the use of OBIS was highly desirable, it would be necessary to develop a format and instructional strategies that could enable a leader with no science background and no training by OBIS staff to use the activities effectively.

Finally, financial concerns faced by community groups dictated that equipment and print materials be minimized to keep the program within the monetary reach of target user groups. Optionally, equipment should be designed simply enough for community groups to construct themselves using materials easily acquired around the house or inexpensively at the store.

The information provided by the community groups at the conference was used by the OBIS staff to redesign the format and approach of the OBIS *Lawn* and *Pond* Units during the winter and spring of 1974. The result was the innovative "folio" format that has since proved itself to be one of the most flexible and effective possible approaches to informal, outdoor education.

Section III

ERA OF FOLIOS AND FIELD CENTERS (1974-75)

Folio Format

Each folio represented a single activity that could be used individually or arranged in groups to explore an environment (e.g. lawn, pond, desert, beach), a concept (e.g. *interaction, adaptation, food chain*), or investigative technique (e.g. sampling, site mapping) in greater detail. By allowing user groups this greater flexibility to use activities independently or structure them by concept or investigative technique as well as by environment, OBIS could be more easily incorporated into a wide variety of community and school group activities in diverse locations.

In order to meet the requirements of these groups, each activity was designed as a 4-page folio printed on heavy, water-resistant paper to insure durability of use in the out-of-doors. The following organization of content was adopted to enable community group leaders with no prior science background to use the activity without formal training.

Background: This section provides the leader with the biological information needed in order to conduct the activity.

Challenge: The investigative task or exploration to be carried out is phrased as a challenge to the participants.

Materials: This section in each folio lists all materials the group leader needs in order to conduct the activity. Most of these materials can be easily located around the house or school or inexpensively purchased at a local store. Furthermore, many items can be constructed by the participants.

Preparation: Group leaders are advised of any advance preparations for a given activity (e.g. finding particular materials, scouting suitable sites).

Action: The activity itself is described step by step in this section. Because the "action" is discovery-oriented, the leader can participate in the activity with the other members of the group, rather than acting as a dispenser of correct answers.

What Do You Think? This section suggests a variety of questions the leader may use to promote discussion following the activity.

Follow Up: Whenever possible, constructive extension of the current activity are suggested to the leader in order to give participants the opportunity to explore the subject matter of the folio in greater detail or from different perspectives. These additional activities are, of course, optional.

What To Do Next: Flexible structuring of activities to accentuate an environment, a concept, or investigative technique is faciliated by suggestions to the leader about what other folios to use in conjunction with the current activity. In all cases, however, folios were designed to be completely effective even when they are used individually in total isolation from other OBIS activities.

Description of Folios in Set I.

The first 24 OBIS folios drew heavily upon the 21 activities contained in *The Lawn* and *The Pond* Units. However, all activities were modified and revised to meet the requirements of the new format. A description of these Set I folios follows:

Adaptation: Predator-Prey: Students create their own predatory devices in order to snare their prey.

Animal Movement: Students study how aquatic animals move through the water.

Animals In a Grassland: The challenge in this folios is to find as many different kinds of animals on a lawn as possible.

Attention: Students use their imaginations to create "eye-catching" designs that will call attention to themselves in a particular habitat.

Bean Bugs: Participants learn how take a census when the organisms in a particular population are too numerous to count accurately.

Great Streamboat Race: The streamboat race is really an excuse for participants to discover the rates and directions of currents in a stream.

Habitat - Sun Prints: Participants take "pictures" of organisms and objects in a given habitat in this activity using special paper as "film" and the sun as a "flashbulb."

Habitats of the Pond: This activity challenges participants to locate organisms that live in five different pond habitats and describe where they live.

How Many Organisms Live Here? This activity enables participants to apply the census-taking techniques introduced in *Bean Bugs* to an actual population of organisms in a pond.

Invent A Plant: Students construct a plant model that is adapted to a particular environment and habitat.

Invent An Animal: How well students can camouflage an imaginary animal from its enemies by blending into a selected habitat is explored in this activity.

Mapping Your Study Site: Scientific techniques for investigating and recording information at a study site are investigated in this activity.

Moisture Makers: Students compare the moisture released from different types of leaves by comparing the color change of cobalt chloride papers.

Natural Recycling in Soil: Participants bury dead vegetation in the soil in various kinds of containers and compare the recycling process that takes place in each case.

Natural Recycling in Water: The recycling process in an aquatic environment is investigated.

Out of Control: By gradually eliminating human management of a lawn area, participants observe the changes that occur as the lawn reverts to a "natural state."

Plant Hunt: This activity challenges participants to use their power of discrimination to find as many different plants as possible in a designated study site.

Plant Life Around a Building: This activity focuses on the ways in which a building and how it is managed affect plant growth in the immediate vicinity.

Seed Dispersal: Participants adapt dried beans or peas so that they can be dispersed by ordinary natural forces.

Sticklers: Artificial organisms in a simulated environment are studied by participants in order to determine where they live and their patterns of distribution.

Terrestrial Hi-Lo Hunt: This activity highlights data-gathering techniques related to extremes of environmental variables at a designated study site.

Water Holes to Mini-Ponds: This activity challenges participants to compare changes in fertilized and unfertilized water holes.

What Lives Here? An aquatic site is investigated in order to determine plants and animals living in that environment.

Who Goes There? Tracking animal tracks enables participants to identify animals without seeing them.

Folio Development: Another OBIS Innovation.

Each of the above activities underwent an extensive process of prototype development, local field-testing, revision, further testing nationally, and final revision in order to insure that the folio format, instructional strategies, and activity content in fact met the types of needs voiced by community group leaders attending the conference. Each OBIS folio, or activity, underwent the following developmental stages in order to meet the expressed needs of potential user groups.

Exploratory Phase: During this phase, OBIS author/developers selected a concept, investigative technique, environment, or a combination of the three that met one of the major educational objectives of OBIS. Activity content was then researched by the author and drafted in the folio format for staff input and suggestions. Following staff conferences to "brainstorm" the activity, the author/developer incorporated relevant suggestions into a revised version of the prototype activity for informal testing.

Initial testing took place at a variety of sites on the University of California campus and at selected off-campus sites with groups of youngsters volunteering to participate. Most testing took place at the Botanical Garden and Lawrence Hall of Science on the UC campus. Based on feedback from volunteer participants at the appropriate age level, the author/developer modified the activity to strengthen weaknesses and prepared a revised draft of the activity for more formal local testing by interested community groups.

In addition to preparing a "trial draft" of the folio for testing, the author/developer was also responsible for working with the OBIS equipment specialist to design and fabricate the equipment that would be needed by local community and school groups to carry out independent testing with group members.

The *Exploratory Phase* for a given activity spanned periods as brief as two weeks or as lengthy as six months, depending on the ease with which an activity idea could be developed into an effective instructional folio. Also factored into this phase was staff research and development time for ideas that ultimately were not selected for formal activity development.

Local Trial Phase: Those activities prepared in "trial folio draft" form were subsequently field-tested by three to five instructional leaders in the community who were in no way associated with the OBIS Project development team. This independent testing provided the OBIS staff with valuable feedback on the performance of OBIS under actual "field conditions." The feedback gathered during this field-test phase included the following types of information.

- Observer reports by OBIS staff monitors during the use of the activities by the group leader.
- Leader feedback form with leader's comments on strengths and weaknesses of the activity and methods of improving it.
- Student opinion forms filled out by all users to indicate what they liked or disliked about each activity.
- Assessment activities to ascertain user educational gains vis-a-vis the concept, investigative technique, or environment under study.

Based on this extensive and diverse feedback, the staff revised, modified, or simply fine-tuned each activity for production in a "Trial Version." This version of each activity was printed on heavy, water-resistant stock for outdoor use. Equipment and other materials accompanying each folio were also revised and prepared for the next step in the "OBIS Development Process."

Field-Test Phase: Each "Trial Version" activity was field-tested in 10-12 OBIS Field Centers (see below) to achieve the following results:

1. By instituting field-tests in areas outside of the project development area, the staff obtained valuable feedback on the instructional and operational aspects of OBIS activities "in the field."

2. By establishing field-test sites in geographically diverse regions of the nation, the staff was able to determine from the feedback which activities were applicable to all regions and which activities had to be modified or adapted to reflect regional or local variations in conditions.

3. The OBIS staff also used these field-test sites to assess certain approaches to activity evaluation the staff was interested in using to: (a) determine what users learned from each folio; and (b) ascertain whether attitudinal changes occur as the result of using OBIS.

OBIS Field Centers played a crucial role in the development of OBIS from a very early date and continued to aid in the dissemination of OBIS materials and the training of teachers and community group leaders in the use of OBIS long after funds to support such operations had been depleted.

Community Outreach Through OBIS Field Centers

The value of direct participation by community groups in the development phase had already been proved by the excellent feedback obtained by the OBIS staff during its "Community Group Leaders Conference" in January, 1974. From this point on, the OBIS staff continued to expand its contact with local groups in the community and, later, with groups in other parts of the country.

During 1974, for example, OBIS conducted two training sessions for the San Francisco Bay Area Girl Scout Council; a total of 75 Scout trainers were introduced to OBIS so that they, in turn, could begin incorporating OBIS activities into Scout programs and events. The same year, OBIS was used in three Girl Scout day camp programs. In addition, community contact led to the use of OBIS at the Hidden Fall Camp (Santa Cruz, CA) and by the San Rafael (CA) Parks and Recreation Department.

At the same time, OBIS staff began contacting recognized leaders in the field of outdoor biology who worked with school and community groups to solicit their cooperation in the testing and dissemination of information about OBIS to groups in their areas. A total of 13 Field Centers in 9 states were set up in 1974. The Field Center directors agreed to spend one week with OBIS staff becoming familiar with the activities, to field-test OBIS activities in their areas, and to assist the OBIS staff in disseminating information to community groups.

During the spring of 1974, a 5-day Field Center Leadership Traning Conference was held at the Lawrence Hall of Science during which the OBIS staff provided Field Center directors with an in-depth introduction to OBIS. First, the directors observed local community groups using OBIS activities in a variety of situations to illustrate the flexibility of the program and the innovative ways in which OBIS could be used by community groups. Next, the directors reviewed the goals of OBIS and discussed its instructional, operational, and conceptual framework from the standpoint of target user groups in their respective regions. Finally, directors participated with staff and local community group leaders in conducting OBIS activities with community groups.

Due to limited funding for field center support, the number of centers had to be restricted during the start-up period; however, their effectiveness as training and dissemination centers for OBIS led to the establishment of more centers the following year.

The Folio and the Future.

As noted previously, the folio was not merely an innovative format for presenting informal biological activities outdoors, it also represented a fundamental shift in the operational framework of OBIS that was of pivotal importance to the Project's acceptance and effectiveness among school and community groups.

The highly structured "unit" approach with its emphasis on sequential activities spanning a considerable period of time reflected the project's initial orientation towards a more proscriptive curriculum characteristic of traditional classroom programs. However, by actively soliciting the input of community group leaders from the outset of activity development, the OBIS staff was able to make major revisions that did not compromise the educational content of OBIS, but did provide maximal program flexibility to serve the diverse use patterns of community groups nationwide.

Essentially, the adoption of the folio format marked OBIS' shift from a highly structured "curriculum-centered" approach to one that was more flexible and "user-oriented." Furthermore, the establishment of Field Centers at this stage provided an excellent "development laboratory" in which to fine-tune activities for the widest possible use.

This shift to a more flexible and "mobile" presentational format necessitated that the staff place less reliance on certain instructional aids such as audio cassettes which were not as appropriate for use with the folio format.

Section IV

EXPANDING COMMUNITY INVOLVEMENT (1975)

Introduction

The year 1975 marked a period of concerted staff effort to increase the involvement of community groups in the OBIS Project; particularly in its activity development process. In addition to the continuing work of the Field Centers to disseminate information about OBIS, the staff also actively solicited the participation of major community associations with national or regional affiliations in the development and field-test phases of the project. This involvement provided the staff with more, objective input regarding the suitability of OBIS for various user groups nationwide.

The year was also marked by heavy activity development and production. Over 20 formal informational and leadership training presentations were also made by the staff in 1975.

OBIS Project Implementation Grants

The OBIS Project submitted a proposal to the National Science Foundation requesting funds for a series of four implementation conferences aimed at national community group leaders and educators. The goals of the conference were to:

1. Open up lines of communication with national leaders of community groups that are potentially heavy users of OBIS.

2. Solicit their input as to the suitability of OBIS activities for use by their organizations and their suggestions for improving OBIS' suitability.

3. Encourage these leaders to disseminate information about OBIS to

leaders at the regional and local levels.

4. Promote the field-testing of OBIS through these major community organizations.

National Community Groups Conferences: Two such conferences were held (1/29/75 - 2/1/75 and 2/27/75 - 3/1/75) for 23 national community group leaders representing organizations such as Girl Scouts of the U.S.A., Boy Scouts of America, National Jewish Welfare Board, Camp Fire Girls, National Park Service, Salvation Army, 4-H Clubs of America, and American Camping Association.

Each conference introduced the leaders to OBIS, followed with a series of "hands-on" OBIS activities, and ended with discussions about how OBIS could continue to work with community groups in the future. Participants indicated a desire to seek support for dissemination and implementation activities based on their favorable experience with OBIS at the conference.

University Leadership Conference: Similar in content to the above conferences, this conference brought together environmental educators from 23 institutions in 16 states, to discuss the OBIS Project and how OBIS would be utilized in the formal educational sphere. As was the case with community group leaders, educators attending the conference expressed a high degree of interest in the program and inquired about seeking funding to aid in dissemination and leadership training efforts.

Implementation Grants Aid Dissemination

As a direct result of these national leadership conferences, 12 implementation efforts took place during 1975. Two of the grants were awarded to OBIS Field Centers and the remaining 10 educational institutions or community groups that were represented at the implementation conferences. The grants awarded by the National Science Foundation to the applying institutions and community groups were intended for training of their leadership personnel in the use of OBIS materials in order to faciliate the continuing training and implementation efforts of these groups without dependence on the OBIS Project for assistance or support. These grants also enabled groups willing to take the initiative to assume true leadership roles in developing a new community group leadership network which has provided far-reaching services to environmental education programs in general.

The 12 implementation grants could be categorized as follows:

- 9 grants were awarded to educational institutions for leadership training and informational conferences.
- 3 grants were awarded to environmental or community groups (i.e. American Camping Association [IN], Chesapeake Bay Center for Environmental Studies [DC], Conservation and Environmental Studies Center [NJ]).
- 6 grants focused on leadership training and informational conferences for community groups, while the other 6 consisted of school-system-related training and informational activities, including in-service teacher training workshops.
- All grant-related activities were to be completed before the end of calendar year 1975.
- Implementation activities took place in 11 states.

Workshop Dissemination: National & State Efforts.

During 1975, OBIS staff augmented its implementation conferences for state, regional, and national groups. At the state level, OBIS conducted 12 leadership training workshops for 103 leaders and 114 youth leaders of the California 4-H Club. On the national level, 32 workshops and informational presentations were made to 1,457 community group leaders representing more than 16 different community group agencies.

The nature of these workshops varied greatly due to location, size of group, staff availability, and orientation of target community group. Although the large volume of requests for workshops had, at times, taxed the staff and resources of the OBIS Project, the enthusiasm and initiative of these groups made it impossible for the staff to ignore their requests. As evidenced by the initiative shown by leadership conference attendees to obtain implementation support for OBIS, support for OBIS was spreading rapidly and promised—with OBIS staff assistance—to provide an excellent mechanism national distribution. The prospect of implementing an effective environmental education program that was popular with the public and well suited to use in informal learning situations was all the staff needed to remain highly motivated and responsive to the needs of community groups.

OBIS ACTIVITY PRODUCTION

Set II: 24 New Activities.

In 1975, OBIS staff completed trial versions of the next set of OBIS activities in folio format. These Set II activities moved away from an emphasis on science through crafts to a stronger focus on living organisms such as lichens, grasshoppers, crabs, crayfish, insects, litter animals, and birds. Regional diversity is also apparent. Two activities specifically for nighttime use and several designed expressly for use at the sea, at a like, or an a beach are included. Concepts such as *behavior, food chains, diversity,* and *adaptation* are explored in the 24 activities described briefly below:

A Better Fly Trap: Participants make traps to attract and hold flies; a discovery activity in fly behavior.

Animal Anti-Freeze: Youngsters try to keep make-believe animals from freezing. Naturally insulated areas are sought and evaluated to determine their effectiveness.

Animal Diversity: Using sweepnets, youngsters compare the numbers and kinds of animals found in two different activity sites, a managed lawn versus a weedy field, and examine the plant/animal associations on the sites.

Attract a Fish: Using bits of yarn, cloth, food, etc., youngsters investigate the responses of minnows to "bait" of various sizes, shapes, colors, and movement patterns.

Beach Zonation: Children investigate life zones in the intertidal zone on rocky seashores.

Birdfeeder: Kids build and use a simple bird feeder to discover and compare bird behaviors and food preferences.

Crawdad Grab: Youngsters build traps to catch crawdads (or crabs) and learn about crawdad behavior and food preferences in the process.

Flocking to Food: Participants assume the roles of birds and use "beaks" to find organisms that a bird might eat.

Food Chain Game: A simulation activity in which youngsters play out feeding realtionships and modify the ratios of hawks, frogs, grasshoppers, and popcorn.

Gaming in the Outdoors: Two introductory detective games that the youngsters play to build their observational skills and increase their awareness of the outdoor environment.

Hopper Circus: Kids conduct their own side-show investigations of hopping animals and their behavior. For example, how far can a hopper hop? Can hoppers swim?

Lichen Looking: Youngsters investigate the habitats of lichens as well as their shapes, sizes, and the animals associated with them.

Litter Critters: Children search for organisms in ground litter and, using special sets of wheels representing various heads, thorazes, and abdomens, dial the combinations that best represent their creatures.

Metric Capers: Youngsters learn the metric system through a variety of experiences and a game.

OBIS Oil Spill: A simulated oil spill is created with popcorn. Participants follow the spill and estimate the impact on the environment.

Plant Patterns: Youngsters use colored labels to map and discover the distribution of plants in an activity site.

Rock Pioneers: Place bare rocks in the intertidal zone and check them during subsequent meetings for evidence of colonization by plants and animals.

Roots and Shoots: Youngsters try to identify two "mystery plants" (weeds) by digging up and uncovering roots that match those of the mystery plants.

Seas In Motion: Investigate the movements of water along a beach by using water balloons, tennis balls, and marked shells.

Sensory Hi-Lo Hunt: Kids use only their senses to discover the extremes of several environmental variables.

Sound Off!: This activity introduces the concept of animal sound communication through a hide-and-seek game in which secret partners find each other using only sound signals and the sense of hearing.

The Old White Sheet Trick: Children experiment with light on white surfaces to learn how light intensity, type of light, length of light period, etc., have on the behavior of flying night animals.

Too Many Mosquitoes: Youngsters are introduced to biological control by investigating mosquito larvae and their predators.

Water Breathers: An investigation of aquatic animals and the water currents they create when they move and breathe under water.

Trail Module

The *Trail Module* of four activities represented yet another method of meeting the diverse needs of community groups. This module of activities related to a specific theme: the evaluation of the impact of people on a trail and the environment. The four activities acquainted youngsters with the concepts and procedures related to environmental impact studies. Although the module is organized like the "unit," because of the reduced number of activities and the greater flexibility afforded by the folio format, this module concept of thematic activities was used in limited circumstances to highlight a theme of great interest to one or more major community groups. Descriptions of the four activities follow:

Trail Impact Study: The participants plan a safe, convenient footpath through an activity site which has minimal environmental impact on the site.

Cardiac Hill: Using their own pulse rates as a guide, participants determine how steep a trail can be and yet be comfortable for the majority of hikers.

Hold a Hill: In this activity, the participants determine how steep a path can be without causing soil erosion.

Trail Construction: Drawing on the information they have gathered in the preceding three activities, the participants determine the best trail-construction techniques for their site.

Camp Kit for the American Camping Association

The Ecology Committee of the American Camping Association (ACA), following the National Community Group Implementation Conference, began working with the OBIS staff to select 24 activities from Sets I and II for use in ACA camps. The activities selected for the *Camp Kit* met the needs of the camp programs and reflected one of these four conceptual themes: (1) Developing Environmental Awareness; (2) Knowledge of Natural History; (3) Understanding the Meaning of Ecology; and (4) Understanding Environmental Quality.

OBIS printed the activities and packet identification for the *ACA/OBIS Camp Kit*, which was distributed by the ACA at its '75 National Convention and thereafter through its headquarters in Indiana. The OBIS staff conducted three training workshops at the National Convention in March, 1975. This specialized "adaptation" of OBIS was just one of many indications of the efficacy of the OBIS materials and the staff's methods for encouraging community group initiative in developing their own framework in which 50 use OBIS.

Approaches to OBIS Adapted to Folio Format

In Set I, a companion booklet entitled *Approaches to OBIS* was added to OBIS to explain to users this nontraditional method of guiding environmental activities outdoors. Since many community group leaders using OBIS did not have any formal training in the use of OBIS or any formal background in science, the OBIS staff designed this booklet to serve as an introduction to the OBIS approach and activities.

Prior to the completion of Set II activities, the staff revised and expanded the booklet into three separate folios entitled *What is OBIS?*, *Leader's Survival Kit*, and *OBIS Tool Box*. Each is described briefly below:

What is OBIS?: This folio presented community group leaders with a concise description of OBIS' education objectives and short statements highlighting the major concepts (e.g. *food chain, life cycle, adaptation, community)* introduced in OBIS activities. This conceptual framework also acted as a reference work for the group leader to refer only for personal information during the course of Set II investigations.

Leader's Survival Kit: This folio presented simple instructional guidelines to the group leader for using the OBIS folio. In addition a concordance of activities related to concepts, environments, and instructional techniques (i.e. *adaptation,* "mapping" and "distribution," *animal behavior,* and "marine activities") are provided to faciliate the selection of one or more activities to highlight a suitable theme for the group's activities. Finally, factors such as safety, scouting study sites, and the group's potential "environmental impact" are discussed briefly.

OBIS Tool Box: This folio contained summaries of all the equipment and technique cards required for each activity in Set II. Copies of equipment and technique cards are contained in this folio and can be duplicated easily for distribution to the group. Finally, this folio also discussed simple and inexpensive equipment construction.

Set I Reprinted

Because of unanticipated demand for Set I activities, the initial printing of 2,000 sets was sold out during the initial year of availability. An additional press run of 1,500 sets was completed in order to meet the backlog of requests for Set I. All sets were sold at cost to interest community groups and individuals.

Related Publications

As a result of the overwhelming number of requests for information and presentations on OBIS, the staff drafted a publication designed to fill this information void: *Primer: How To Lead an OBIS Workshop*. The *Primer* was designed to aid community group leaders to make an informational presentation on OBIS without necessitating the presence of an OBIS staff member. The *Primer* enabled a person who was familiar with OBIS to organize and carry out an OBIS workshop. The *Primer* assisted the group leader to pinpoint the type and size of the target group, the best site for the workshop, and a convenient time for potential participants. Preparation hints and sample full- and half-day workshop schedules provide concrete examples of how to go about publicizing and structuring the workshop. Finally, the *Primer* explained how to call on members of a network of experienced OBIS users to obtain help with particular details of the workshop. The publication was made available to the public free of charge.

INSTRUCTIONAL STRATEGIES

Regional Development: Minnesota

In October, 1975, an OBIS development team spent 10 days at Green Lake, Minnesota, developing new activities reflecting a particular regional focus. Prior to this, most activities in the OBIS program had been developed on the West Coast which - in spite of its geographical diversity - could not substitute for many geographical characteristics peculiar to other parts of the country.

In Minnesota, for example, the staff explored lake, shoreline, corn fields, woodlots, and old sheds. The organisms and habitats studied in Minnesota provided many fresh perspectives on the out-of-doors. It not only pointed up the differences between habitats in California and Minnesota, but also the similarities - an important consideration, since OBIS staff wanted to maximize the utility of activities nationwide by focusing on as many "universal" environmental characteristics as possible.

Evaluation Techniques More Sharply Defined

Evaluation techniques used by the staff were designed to obtain two types of feedback during the developmental stage of the project. First, the staff was concerned about obtaining feedback on the effectiveness of each activity in conveying information and in changing users' attitudes toward the environment. To this end, the staff developed series of questions and supplementary activities to measure the student's level of understanding of an ecological principle, regardless of the particular habitat used in a given activity to introduce the principle.

Second, another goal of evaluation in the formative stage is to determine as early as possible how community group participants and leaders respond to OBIS. Since the educational objectives of the community are not isolated from the recreational and social priorities of the group, their evaluation of activities has focused more on the user's enjoyment and less on content- and concept-oriented concerns of educators.

The staff considered many factors in the decision to utilize formative evaluation as a major component in its activity development process, and to deëmphasize summative evaluation. The primary considerations in this regard was the pioneering nature of the OBIS Project. The staff explored a radically different format and approach to environmental education with a new audience in a variety of informal settings. In order to insure that OBIS in fact was able to meet the needs of this audience, the staff committed its evaluation resources to gathering data about the project when errors could still be corrected and the activities could still be revised to meet the needs of the broadest possible spectrum of community groups. Formative evaluation was indispensable to the staff in learning how to work with the community as they learned to work with OBIS.

Conversely, summative evaluation was minimized, because it simply wasn't an appropriate evaluation technique for the free-choise environment that governed the leader's selection and sequencing of activities. Control groups and other techniques used to measure absolute learning gains would have been infeasible for such a project and would, in all likehood, resulted in committing more and more OBIS resources to develop summative evaluation techniques to evaluate fewer and fewer activities.

On a more subliminal level, the OBIS staff quickly realized after working with community groups for a time that the criteria of performance by which community group leaders judged OBIS were rarely, if ever, proximate to the staff's concerns about attitudinal changes and learning gains. In fact, leaders' evaluation rarely extended beyond an assessment of the group's interest in an activity, the enjoyment the interaction provided, and whether or not the group wanted to continue using OBIS activities during future group functions.

Finally, the emerging relationship between the OBIS staff and community groups dictated a cautious, low-key approach to evaluation. Group leaders were concerned that OBIS evaluation not in fact be designed to evaluate the community groups rather than the activities. Formative evaluation, on the other hand, encouraged interaction and trust, because the groups were often able to see their suggestions incorporated into revised versions of activities and subsequently viewed themselves in their true roles as co-developers.

Development of the *Ecological Mosaic*.

The *OBIS Ecological Mosaic* was a means of organizing OBIS activities conceptually and facilitating their use in various sequences and mini-programs by community groups. The *Mosaic* was a convenient way for users to select activities by concept, investigative tecnique, environment, or a combination of the three quickly and conveniently. Development of the *Mosaic* began in May, 1974.

Horizontal Axis: Across the top of the *Mosaic* are listed the eight environments for which OBIS activities were developed: lawn/grassland, pond, stream, woods, beach, desert, farm/garden, and vacant lot. By scanning the appropriate column, a community group leader could select an activity focusing on the appropriate environment.

Vertical Axis: This axis categorizes the following of biological concepts and subclassifications according to which OBIS activities were grouped:

1. Major structural patterns in ecosystems:
   a. Species Diversity
      - Abundance
      - Distribution

   b. Species Dominance
      - Ecological Dominance
      - Esthetic Dominance
      - Economic Dominance

   c. Growth Forms or Life Forms
      - Stratification and Zonation
      - Variation of Form Within One Population
      - Variation of Forms of Different Populations

2. Major Functional Patterns in Ecosystems:
   a. Food Webs
      - Identification of Trophic Levels
      - Interactions Between Trophic Levels
      - Biogeochemical Cycles.

3. Changes in Ecosystems:
   a. Periodic Changes
      - Abiotic Changes in Environment
      - Biotic Changes in Environment

   b. Successional Changes
      - Abundance of Species

- Distribution of Species
- Ecological Dominance
- Identification of Trophic Levels
- Interaction Between Trophic Levels
- Biogeochemical Cycles

c. Natural Selection
  - Factors Involved in Natural Selection
  - Observed Results of Natural Selection

4. Applied Ecology:
   a. Identification and Use of Natural Selection
   b. Environmental Health
   c. Man's Influence on Biohistory.

In conclusion, the *Mosaic* was also a valuable tool for the staff in planning future activity development to fill the gaps and structure a balanced program covering all major concepts in each of the eight target environments.

Section V

FIELD CENTERS BECOME VOLUNTEER RESOURCE CENTERS (1976)

Introduction.

Congressional withdrawal of all implementation funding for pre-college science education programs come at a time when a six fold expansion of OBIS Field Centers was raking place. In spite of this unanticipated development, support among community groups for the OBIS materials made it possible to establish a volunteer network of OBIS Resource Centers.

The community support for OBIS was manifested in many other ways during this and subsequent years. Community groups began experimenting with OBIS in new situations and for special groups. Regional research and activity development continued during this period and cooperative efforts between OBIS staff members and community groups reached a new level.

Implementation Funding Prohibited.

As a result of the passage of House Resolution 8070, no further funding was made available for the implementation of National Science Foundation pre-college science education development projects. This necessitated the cessation of all OBIS support for informational workshops and training sessions conducted by the OBIS Field Centers which, in the interior, had increased to 72. In order to continue the efforts nationwide to inform the public about OBIS, the staff established all-volunteer Resource Centers to replace the OBIS Field Centers. Many key resource people who attended OBIS workshop or awareness conferences were also invited to become Resource Center directors. By the end of 1976, 72 Resource Centers in 38 states were operational.

EXPANDING INTERACTION WITH COMMUNITY

The following descriptions of OBIS-community group collaborations demonstrate the degree to which the public responded to OBIS materials and their enthusiasm for incorporating the activities into their community group programs.

OBIS - Girl Scout Achievement Patch.

The San Francisco Bay Girl Scout Council created an "OBIS Achievement Patch" for Girl Scout leadership personnel who have not only become familiar with OBIS activities, byt have also guided OBIS activities with youngsters. In order to qualify for this achievement patch, a Girl Scout leader must:

1. Participate in at least one OBIS workshop conducted by a qualified OBIS trainer.

2. Guide OBIS activities - at least two - with other groups of girls or adults to familiarize them with the OBIS approach to the environment and ecological relationships.

3. Share her experience guiding OBIS activities with the OBIS staff by submitting an "OBIS Activity Feedback Form."

Cooperative efforts with the Girl Scouts of America began in earnest in 1974 and continued to be very valuable feedback for the OBIS staff on use in diverse learning situations. The method of integrating community group programs with OBIS' need for feedback directly from the field made efforts such as this extremely productive for both groups.

Tucker Wildlife Sanctuary.

The Tucker Wildlife Sanctuary in Orange, California incorporated OBIS activities into its Nature Series pamphlets which are distributed to teachers of science in the local area. The pamphlets are designed as a resource for persons who want to enrich ecology or biology programs currently in use by school and extracurricular organizations. At the end of each chapter in the pamphlet, specific OBIS activities treating the same biological concepts are recommended.

Pacific Science Center.

In Seattle, Washington, the Pacific Science Center incorporated OBIS into its extensive science courses and public programs. As the only science museum and center in western Washington, Pacific Science Center has proved to be excellent location for introducing OBIS to community groups and the public through regular classes, after-school workshops, and Saturday science activities.

Department of Environmental Outdoor Education.

The DEOE in Nashville, Tennessee, was able to incorporate OBIS outdoor environmental activities in conjunction with an archaeological excavation of a house built @ 1880 and believed destroyed. The excavation was carried out under supervision by six schools connected with the "outdoor resident school" program of DEOE. OBIS environmental activities were combined with living history lessons and other materials determined by the participating faculty members of the six schools for each week's program. Each week, DEOE environmental staff, three school classes, their teachers, and six trained high school students, met for outdoor education activities.

Resident Outdoor School.

A Resident Outdoor Environmental School (ROES) in Blaine County, Idaho also incorporated OBIS activities into its program which utilizes national parks and forests to teach the public firsthand and about man's relationship to the environment. OBIS activities are used with four topics of study: soil, water, plants, and animals.

"Earth Week" in Kansas.

On April 21-22, 1976, the two-day Conservation Field Days, part of Earth Week festivities, featured OBIS activities in its environmental science and outdoor biology activities and programs.

Oakland (CA) Junior League.

During 1976, 15 Junior League volunteers conducted OBIS activities in ten classrooms in three elementary schools. They were trained by the OBIS staff at the Lawrence Hall of Science. The success of the program prompted the Oakland Unified School District to present a "Master Plan Citizens Committee Award" to the OBIS Project Committee of the Oakland Junior League.

Expanding Young Women's Horizons.

On March 20, OBIS staff conducted challenging outdoor biology classes at a 1-day "Expanding Your Horizons" Conference held at Mills College (Oakland, CA) to encourage young women to become more interested in pursuing science as a possible career. Over 200 women in junior and senior high school took place in the conference.

The number of imaginative applications of OBIS activities are far too numerous to mention; however, the preceding list indicates the diversity of activities initiated by enthusiastic supporters of OBIS in all parts of the nation.

ACTIVITY DEVELOPMENT

Set III Under Development.

The 48 activities comprising Sets III and IV were under development during 1976. In conjunction with this development work, an OBIS development team of author/developers journeyed to Priest River, Idaho to spend one week at the Intermountain Experimental Forest Station. An Idaho Resource Center arranged for the development team to consult with the Intermountain Chief of Research from the University of Idaho, and the Superintendent of Intermountain for local expertise during development. A total of about 40 activity ideas were developed, including three nighttime activities and six dealing with the forest floor - a substrate not easily found in the San Francisco Bay Area.

Related Publications.

The OBIS Trail Module: The four activities comprising the *Trail Module* were printed in the "Trial Version" folio format and made available to community groups and the public at cost.

OBIS Resource Directory: A directory of the 72 OBIS Resource Centers was published in order to promote contact between community groups and a resource center in the area. At the request of the National Science Foundation in 1976, no new Resource Centers were established.

Section VI

EXTENSIVE ACTIVITY DEVELOPMENT (1977-78)

Introduction

The year 1977 marked a decided shift in emphasis of staff efforts that continued until the end of the final funding period in May, 1979. Prior to 1977, the staff concentrated on the development, testing, and refinement of the OBIS approach to informal science education in the community. This included developing the philosophical framework of the project and translating these educational objectives into effective instructional strategies, format, and activity content to meet the needs of the target audience. Only through an extensive exploratory phase, thorough field-testing, and refinement of those materials and approaches was OBIS able to serve this new audience successfully. The 5-year exploratory phase was followed by a 3-year period of extensive activity production and adaptation, both nationally and internationally. Without this 5-year period to fully explore both the target audience's needs and a variety of instructional strategies to meet those needs, OBIS might never have achieved its widespread acceptance and support today.

Regional Activity Development

In preparation for the production of Trial Edition Sets III and IV, OBIS development teams made three regional development trips to explore diverse geographical characteristics for a series of specialized activities as well as those with characteristics common to most regions.

Farwell, Michigan (2/77): In response to numerous requests for winter activities, particularly those involving snow, the development team worked with the Explorer Division of the Boy Scouts of America at an all-weather camp near Farwell, Michigan. The development site consisted of a lake surrounded by forests with intermittent open fields. A school near Farwell provided the team with young people to use prototype activities and give the staff some initial feedback on their ideas. Some of the ideas explored during this development trip were tracking, orientation, migration, trail marking, aquatic life under the ice, and effects of snow cover.

Rutherford County, North Carolina (9/77): A rain-soaked forest at Golden Valley Girl Scout Camp in Rutherford County, North Carolina acted as the site for development of a short series of activities on the eastern forest environment. Following four days of activity development by the OBIS team, two classes of upper elementary school students tested the new activity ideas while they were still in prototype form.

Phoenix, Arizona (10/78): The final regional development for OBIS focused on the desert environment outside Phoenix. The development team set up headquarters at the Maricopa County Park and Recreation Outdoor Facility which provided an excellent site for a variety of activity development. All activities were tested by 28 eight-graders from a nearby school.

Activity Production: Trial Edition, Set III

The third set of 24 OBIS activities was produced in folio format for use by interested schools, community groups, and individuals. This set of activities focused on animal behavior as well as the

the diversity and adaptability of plants and animals in various environments. As a result of the regional development trips, many of those ideas were incorporated into this set of activities, which are described briefly below:

Ants: Investigate ant behavior.

Beachcombing: Search for signs of animal and plant life on a sandy beach.

Can Fishing: Discover what kinds of organisms live on or in submerged cans.

Clam Hooping: Estimate the number of clams on a beach or mudflat, and explore the natural history of clams.

Envirolopes: Look closely at your environment to discover the variety of textures, colors, odors, and evidence of interactions.

Fly a Leaf: Discover which leaves are the best wind catchers by flying them on lines.

Follow the Scent: Explore your sense of smell by following scent markers outlining your group's "home territory."

For the Birds: Attract birds to you and investigate their behavior.

Hold It: Create an organism that will withstand currents in an aquatic site. Compare the holding adaptations of animals that live in the site.

Isopods: Investigate the body structures and behaviors of isopods.

Jay Play: Discover jays' color preference in food. Try to change this preference by salting the preferred food.

Junk-in-the-Box: Find out how animals use man-made litter in their environment.

Leapin'Lizards: Investigate the feeding behavior of lizards and their interactions with each other.

Mystery Marauders: Find out which plants in your activity site are being attacked by insects. Identify the insects that could be responsible for the damage.

Night Shine: Search for aquatic animals that are active at night (nocturnal). Discover which ones seem to be attracted to light.

Pigment Puzzles: Explore the variety of plant colors and solve natural pigment puzzles.

Shake It!: Find a community that matches a "mystery community" by locating similar animals living on trees and shrubs in your activity site.

Silent Stalking: Survive as a predator or prey either by silently stalking and "catching" your prey, or by detecting and stopping approaching predators from catching you.

Swell Homes: Locate swell homes (galls) on plants. Find out who lives in those homes

Variation Game: Investigate variations between individuals by playing simple games.

Water Snails: Discover the preferred habitats of water snails.

Water Striders: Explore the movement and feeding behavior of water striders.

Web It: Find out how spiders trap food in their webs yet avoid sticking to their own webs.

Web Weavers: Use string art to reproduce a spider's web and find out how it was built.

Activity Development: Trial Edition Set IV

This final set of 24 activities focused once again on games, simulations, and craft-oriented activities that give young people concrete experiences with animal behavior and the adaptations of plants and animals. Limited series of activities in this set treated desert and snow environments as well as "nonliving" environments (e.g. rotting logs, soil).

Acorns: By playing a survival game, the youngsters compare the winter food-storage strategies of squirrels.

Bird Nests: The students construct bird nests, place them in their site, and try to locate and identify each other's nests.

Bugs, Worms & Others: The teams invent populations of make-believe organisms and then investigate real populations living in their activity site.

Cactus Wheel: With a simple hunt-and-walk technique, the youngsters determine the population densities of several desert plants.

Cool It: By taking advantage of the temperature variations in their site, the youngsters try to keep their "thermometer lizards" from overheating or getting too cold.

Creepers and Climbers: The participants investigate specialized climbing structures and growth patterns of different vines.

Damsels and Dragons: The students investigate damselfly and dragonfly perching behavior and discover how these "D-flies" react to flying decoys.

Desert Hunt: In this introduction to the desert, the teams design OBIS scavenger hunts for each other.

Desert Water Keepers: The youngsters experiment with paper leaf models to find out how different desert plants conserve water.

Flower Powder: The youngsters use artificial bees and paper models of flowers to find out how pollen can be moved from one flower to another.

Helping Out: In a simulated predator/prey game involving wolves and antelope, the participants find out how cooperation contributes to survival for certain animals.

Hopper Herding: The students hide and navigate in a kid-sized pile of leaves to experience the environment of animals that live in fallen leaves.

Logs to Soil: After cutting through and investigating rotten logs, the teams make log-profile puzzles for each other.

Population Game: In a feeding game, the youngsters find out how many deer can survive in a herd's "home range."

Night Eyes: Using flashlights, the participants locate and identify mysterious eyes in the night.

Salt Water Revival: During a low tide, the youngsters create an artificial high tide and observe its effects on marine animals.

Sawing Away: After sawing sections from fallen logs, the youngsters count tree rings and study the patterns of tree growth.

Scent Tracking: Using spray misters and liquid extracts to simulate prey scents, the participants play a game in which predators track a prey by following its scent.

Scram or Freeze: After being introduced to "scram" and "freeze" escape behavior in a game, the participants investigate the escape behaviors of animals that live under logs and rocks.

Snug as a Bug: The youngsters make homes for imaginary insects, and then search for real animals' constructions in and on leaves.

Super Soil: The students investigate the differences between a commercial garden soil and local soils.

Tree Tally: Participants use the OBIS transect to find the most common tree in a forest.

Wintergreen: Participants find green plants under the snow and determine the light and temperature conditions around those plants.

OBIS Goes Hollywood

Since OBIS relied so heavily on personal participation in activities, the staff believed that the best method of conveying the unusual characteristics of this project to the public was through an informational film dramatizing OBIS activities in the out-of-doors. This 16mm, 17-minute film shows children from schools and community groups participating in five OBIS activities: *The Old White Sheet Trick, Water Breathers, Roots and Shoots, Invent an Animal,* and *Web It.* The film was intended to demonstrate representative activities to teachers and community group leaders. The film was made available to interested parties for a nominal charge of $2.00 to cover postage and handling. Six prints of *OBIS* were struck and distributed widely during ensuing years. Effective November 1, 1979, the film was distributed through University Extension Media Center at the University of California.

Other Publications

The OBIS Story: This 24-page booklet was designed as a convenient overview of the OBIS materials for potential user groups. Through the use of text, illustrations, pictures of young people participating in OBIS activities, and a sample folio insert it explained:

- The "OBIS approach."
- Who uses OBIS?
- What is OBIS?
- How to guide an OBIS activity.
- Activities that are available.
- Resources available to OBIS users.

Resource Center Directory: An updated version of the *OBIS Resource Directory* was printed listing all 72 centers. The pamphlet was designed in order to put potential users of OBIS in touch with resource personnel in their vicinity to assist them in incorporating OBIS into their community group's activities.

EXPLORING ADAPTATIONS OF OBIS: DOMESTIC

Introduction

The flexibility of OBIS made it an excellent program for adaptation by groups with special interests and needs. During the period 1977-78, OBIS was adapted by a number of groups to meet the needs of disadvantaged youth, Spanish-speaking children of migrant farm workers, and visually impaired youth at the Enchanted Hills Camp. These domestic adaptations, moreover, were a precursor to substantial adaptations of OBIS abroad.

California Mini-Corps Bilingual Activities:

The development of bilingual OBIS activities evolved out of an informational workshop the OBIS staff conducted for Mini-Corps personnel in June, 1976. The Mini-Corps is an educational program to enrich the educational opportunities of youngsters of migrant farm workers. It is a program of the California State Department of Education, Migrant Education Division. After seven days of participatory OBIS activities, the 35 Mini-Corpsmen--bilingual, college-age Chicano men and women--broached the subject of developing Spanish and/or bilingual OBIS activities for use by Mini-Corps.

The goal of the Mini-Corps summer outdoor education program was twofold: (1) to introduce disadvantaged Chicano children to their biological environment; and (2) to stimulate the development of their English language skills and proficiency. While the latter goal was not a stipulated objective of OBIS, the Mini-Corps representatives who took part in the seven-day OBIS program believed that OBIS was just what they needed, because OBIS stimulates participants to share observations and communicate with each other while carrying out an activity. The emphasis on many group activities--such as game simulations and craft-related tasks--encourage a high level of verbal interaction. The Mini-Corps representatives felt that OBIS--which would create a high level of interest among summer program participants--would be easily "camouflaged" as a basic language skills development tool without the participants ever being aware of it.

During August, 1976, the Mini-Corps leadership requested that the OBIS staff design a package of OBIS materials expressly for Mini-Corps use. The result was a selected set of materials designed to meet a particular community group's rather specialized needs. Again, OBIS demonstrated its versatility and adaptability.

In joint consultation, the Mini-Corps Leadership and OBIS staff selected 20 activities for inclusion in this bilingual series that were the most appropriate for summer camps:

Adaptation--Predator-Prey
Animal Movement in Water
Ants
Attract a Fish
Envirolopes
Food Chain Game
Gaming in the Outdoors
Hold It
Invent an Animal
Invent a Plant
Lichen Looking
Litter Critters
Plant Hunt
Plant Patterns
Roots and Shoots
Seed Dispersal
Silent Stalking
Sound Off!
Sticklers
What Lives Here?

The OBIS staff then developed a specific "Language Development" section for each of the 20 activities that explained key concepts utilizing simple vocabulary, and suggested techniques or instructional strategies for maximizing the participants' guided use of English throughout the activity. The Mini-Corps group leader was then able to structure the activity in such a way that varying degrees of emphasis could be placed on biological exploration or English language skills, depending on the language proficiency of a given group of participants.

Two sets of folios for the same 20 activities were produced for the Mini-Corps. First, Spanish translations of the 20 activities were produced in folio format. They were used to aid Mini-Corps personnel--who had received their science training in English at American Universities--in conveying technical terms and scientific concepts to Spanish-speaking children whose language ability in English was still inadequate. These folios were also effective as entry-level activities for children with no prior training in English; they were able to absorb the science content until their language proficiency in English reached an adequate level.

In the second set of folios, each folio contained both English and Spanish portions to indicate to the group leader the preferred language of communication at each point in the activity. Generally speaking, Spanish was used at critical junctures (i.e. introduction of a key concept) to insure that students grasp the content, regardless of their grasp of English. These 20 activities were completed in 1978 and have been used in Mini-Corps outdoor summer education programs ever since.

Enchanted Hills Camp

The Enchanted Hills Camp north of San Francisco provided another opportunity to explore the suitability of OBIS to highly divergent needs of community groups. The OBIS staff was invited to guide selected OBIS activities with groups of visually impaired young people at the camp. With minor modifications in the instructional approaches, the OBIS activities proved highly effective with these disabled young people, because in many cases, OBIS emphasizes the use of senses other than sight to make "observations" or gather data. This deemphasis of sight makes those activities extremely effective for blind and low vision persons. Three activities will be used in these special programs: *Sound Off!*, *Silent Stalking*, and *Roots and Shoots*. In the first two activities, the visually impaired younsters actually displayed a slight advantage over their sighted peers, who were unaccustomed to locating objects or people only by sound.

EXPLORING ADAPTATIONS OF OBIS: INTERNATIONAL

Introduction

It has been extremely difficult to monitor the numerous "ad-hoc" translations and adaptations of OBIS that have resulted from the participation of foreign educators in OBIS informational workshops during visits to the Lawrence Hall of Science. The efforts of such individuals in Scandanavia, Europe, and Asia have been augmented by formal adaptations or use of OBIS in foreign school or community-oriented science programs such as those described below:

Science Education Centers: Philippines

During 1977, a total of 5 science educators from the Science Education Center at the University of Philippines spent six weeks at the Lawrence Hall of Science working with the OBIS staff in order to determine the suitability of OBIS as one of the inservice teacher training programs offered by the University's science education centers which are located throughout the country. In some cases it was necessary to change the flora, fauna, or organism under investigation to reflect either national or regional characteristics of the Philippines; in other cases, only materials need be substituted while the activity was carried out without modifications. Since that time, OBIS has continued to be an informal yet effective resource for teachers of science in the Philippines.

OBIS in Australian Elementary Schools

Dr. Al Gibbs spent one year with the OBIS staff in 1977 while on sabbatical leave from the Science Department of Mitchell College of Advanced Education to work with the OBIS staff in adapting OBIS activities for Australian desert environments and which were ultimately earmarked for use in Australian elementary schools.

Hebrew Edition Published in Israel

Beginning with an OBIS participatory seminar for 45 Israeli teachers and environmental leaders in July 1977, a long-term development project took shape under the direction of the Israel Science Teaching Center, the Environmental Protection Agency of the State of Israel, and the Ben Gurion University of the Negev. A series of 20 OBIS activities were selected for appropriateness to the arid climate and terrain of the Negev region of Israel. As each activity was modified, OBIS staff reviewed the modifications before translation into Hebrew and the production of the revised folio. The materials have been used in Israel for a number of programs, including science and language instruction for immigrant children and also for use by disadvantaged children in the Beer Sheva area.

FUNDING CYCLE ENDS: COMMERCIAL PUBLICATION BEGINS

Introduction

May 31, 1978 marked the end of National Science Foundation support for OBIS that began in 1972. In order to insure that Set IV materials were properly distributed and a host of other project responsibilities successfully completed, the OBIS Project applied for and received a 12-month, no-cost extension. The end of federal funding, however, was but a transition in the OBIS Project's status from science education development project to commercial science program.

User Survey

Early in 1978, an OBIS staff member sent out a questionnaire to school and community group leaders using OIBS in order to ascertain how OBIS was being used by target audiences. The general findings of this informal survey offer some indication of OBIS' ultimate success in meeting the needs, diverse types of users. Based on 192 responses, divided almost evenly between school groups and community groups, the following patterns emerged:

- Most users are in elementary or junior high school.
- Teachers grouped activities by concept twice as frequently as community group leaders.
- Game-like activities were most popular with all users.
- Users believed OBIS equally suitable for school, extracurricular, and community group activities
- Activities group leaders used most often were ones they had been trained to use.
- Teachers selected activities because they were fun, whereas community group leaders placed biological concepts high on the list of selection criteria.

It was interesting that teachers did not find the unconventional format and instructional strategies unsuitable for the school and that community group leaders were more interested than teachers in educational content over recreational "appeal" of activities. The survey indicated that the actual patterns of use among both school and community groups followed those anticipated by the staff as the result of their close working relationship with these groups from the early developmental phase on. That the survey produced no real surprises was no real surprise, because the staff became extremely familiar with the target audience as quickly as possible.

Section VII

OBIS AS A COMMERCIAL PRODUCT (1979-81)

Introduction.

The search for a commercial publisher for OBIS began on December 5, 1977, when formal requests for bids were sent to interested publishers. The deadline for bids was January 31, 1978. The review and negotiations process lasted about 10 months, at which time Delta Education of Nashua, New Hampshire was selected as the commercial publisher of OBIS.

OBIS Prominence Spreads Nationwide.

The high degree of interest in OBIS expressed by educational publishers generally stemmed not only from the quality of the materials and the innovative approaches developed by the OBIS staff, but also from the enthusiastic endorsement of the product by target user groups and the extensive volunteer information network that developed through the years. At the end of the final funding period, the OBIS staff received permission to expand the number of OBIS Resource Centers, which subsequently increased to 97 in 42 states and Canada. The OBIS staff amassed a mailing list of 17,000 who regularly received information about the project.

The OBIS staff and Field/Resource Center personnel authored over 50 articles for professional journals, community group publications, magazines, and newspapers (see Appendix D for a bibliography of OBIS publications). In addition, over 650 informational and leadership training workshops were conducted in the U.S. and its possessions. The high visibility of OBIS in the schools and the community was instrumental in the high degree of interest shown by commercial publishers in the Project.

Following the selection of Delta Education as the OBIS publisher, the staff began working with Delta to revise activities for commercial publication. Revisions were made on activities that enhanced their marketability without altering the format and content of the program in any way.

OBIS Revisions.

The revisions of OBIS activities began in 1979 and will continue through 1981. The revisions and production are being handled by the OBIS staff at the Lawrence Hall of Science in consultation with Delta personnel in New hampshire. The revisions fall into the following categories:

"Module" Reorganization: The 97 activities selected for inclusion in the commercial edition are no longer grouped by set (i.e. Sets I, II, III, and IV) as was the case during the development phase; rather, Delta preferred their being organized in ways that would enable user groups to select group of related activities for use in their programs. These topical clusters, called "modules," focus on specific aspects of outdoor biology education such as:

- Concepts: *Adaptations, Animal Behavior, Aquatic Animal Behabior.*
- Investigative Techniques: *Outdoor Study Techniques.*
- Related Recreational Activities: *Bio-Crafts, Games and Simulations.*
- Particular User Group Orientation: *Child's Play, For Eight- to Eleven- year-olds, For Large Groups, For Small Groups and Families.*
- Environments: *Desert, Seashore, Backyard, Schoolyard, Trail, Forest, Campsite.*
- Miscellaneous: *Wintertime, Nighttime, OBIS Samplers, Human Impact.*

The commercial edition of OBIS contains 27 modules. Because a number of the activities are applicable to more than one module, copies are included in each relevant module. In this way, a group can obtain as many activities pertaining to a single module topic as possible without having to purchase additional modules to obtain an activity relevant to more than one module topic.

OBIS "Sampler": This module of four representative OBIS activities was added in order to introduce OBIS to potential users. The four activities, moreover, highlight the key instructional strategies and conceptual framework of OBIS.

Activity Name Changes: Certain activities' names were changed during the revision process (see final module and activity titles in Appendix E).

Activity Components.

Each activity in the commercial edition of OBIS contains a 4-page folio, called the "Leader's Survival Kit." This folio contains background information on OBIS and hints for using OBIS folios. The "Leader's Survival Kit" also covers the OBIS folio format, basic equipment, guides, site selection, safety and conservation.

Included in some activity folios are Action, Equipment and Techinque Cards. These cards are described below.

Action Card: This card presents one or more challenges for the participants to solve as an integral part of the activity. The "Action Card" may contain one or more challenges for teams or individuals to carry out.

Technique Card: These cards introduce the participants to a particular investigative technique (i.e. using the sweepnet, sampling a population) needed for completing the entire activity.

Equipment Card: This card describes the step-by-step construction of simple equipment items: participants are able to cut costs and increase their involvement in the activity by constructing their own equipment; however, many equipment items can also be purchased from Delta Education.

Conclusion.

The commercial publication of OBIS will increase greatly the overall impact this Project will have on community and school groups in the future as the use of OBIS expands. The commitment of OBIS user groups to the Project has been remarkable as much for its longevity as for its extent. For example, when implementation funding was withdrawn for the operation of the 11 OBIS Field Centers in 1976, the number of newly constituted volunteer Resource Centers rose to 72! After the moratorium on the establishment of new Resource Centers was rescinded in 1979, the number of volunteer Resource Centers rose by 35% to over 100 where it remains today.

The longevity of commitments made by individuals, community groups, and educational institutions to OBIS is a "leading indicator" of OBIS' seminal position in the field of informal science education in the community. There is no doubt that this longevity also portends a continuing impact on science literacy and awareness among the public. In this respect, OBIS has far exceeded the staff's wildest expectations and may go on, through the commercial edition, to fulfill their wildest dreams.

Section VIII

OBIS AS A "LEADING INDICATOR"

The succes of OBIS in tapping a vast, new arena for science education is remarkable for the number of obstacles it has had to surmount in order to function effectively as an informal education program. First, it has to successfully complete for the user group's attention with purely recreational and craft-oriented activities without any of the average afforded by the "captive" environment of the classroom. Second, OBIS evolved into format and approach to science education that proved easy to incorporate into highly diverse activities and events sponsored by community groups.

In the course of overcoming these and other obstacles, OBIS shed light on some factors of major import for other science educators interested in reaching large groups of students outside the classroom:

- Large numbers of children who normally dislike science in school can benefit from a more relaxed, less formal framework like OBIS.

- The greater flexibility of the community group makes it a better setting for outdoor activities.

- Community group summer programs reach a substantial percentage of the nation's 7- to 15-year -olds and should be utilized more extensively for science education.

As mentioned previously, the OBIS Project has provided the staff with valuable experience in the area of community-oriented education. OBIS proved that simple, easy-to-use materials that are flexibly structured to meet time constraints, site restrictions, and a group leader's lack of any science background can result in heavy demand for science-related activities.

The most important aspect of OBIS was the staff's extremely close relationship with target user groups from initial activity development until commercial publication was completed. The feedback and suggestions provided by these groups were of inestimable value to the staff in "fine-tuning" the program until they were able to meet a diversity of needs and use patterns by many kinds of groups.

During the course of development, OBIS staff received many requests for science materials "like OBIS" but treating other scientific disciplines. Those requests included programs in physical Sciences, earth sciences, the science of survival, and the physiological sciences. The positive experiences of most community groups with OBIS have created enthusiasm for informal science activities among those groups. The pleasant recreational dimensions to many OBIS activities have created a predisposition to this brand of science; it would be a shame not to capitalize on this newly created interest in science among community groups where science materials in other subject areas could utilize the extensive OBIS network of community groups and schools that would welcome and - most importantly - *use* OBIS-style activities focusing on other branches of science.

A substantial investment has been made in community - based science education. The real question is: Is there a *continuing* commitment to tap this marvelous resource? Community groups and science educators have demonstrated a remarkable commitment to OBIS in the past and the OBIS staff believes that the OBIS approach could be modified for other science areas and garner the same support from educators and the community. In this way, the effectiveness of this approach to informal science education, developed over a period of 5 years, could be expanded and more fully exploited as a model for community-oriented education in the future.

APPENDIX A

OBIS Personnel

APPENDIX A

OBIS Personnel

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APPENDIX B

Funding History

APPENDIX B

Funding History

Development Grant No.SED 72-05823 (later PES 72-05823):

4/15/72 - 8/15/73	$ 100,000
8/16/73 - 12/31/74	$ 232,000
1/1/75 - 3/31/76	$ 336,600
	$ 250,800
4/1/76 - 5/31/78	$ 545,100
5/1/78 - 5/31/79 (No-cost extension)	
SUB-TOTAL	$ 1,464,500

Implementation Grant No. PES 72-01668:

1/15/75 - 3/31/76	$ 79,880
TOTAL DEVELOPMENT/IMPLEMENTATION	$ 1,544,380

Income Derived from OBIS Kit Sales to Augment Funding:

5/75 - 6/74	$ 1,675.68
7/74 - 6/75	$ 32,338.01
7/75 - 6/76	$ 62,107.87
7/76 - 6/77	$ 68,827.11
7/77 - 6/78	$ 78.867.53
7/78 - 6/79	$ 70,539.52
7/79 - 6/80	$ 62,098.94
7/80 - 2/81	$ 29,074.40
TOTAL KIT SALES	$ 405,529.06

APPENDIX C

OBIS Informational Workshops (1973-1980)

APPENDIX C

OBIS INFORMATIONAL WORKSHOPS (1973-1980)

1973

10/73: National Science For Youth Annual Conference
Boston, MASSACHUSETTS.

10/73: Ukiak Unified School District Presentation
Ukiak, CALIFORNIA.

12/73: Modesto Unified School District Presentation
Modesto, CALIFORNIA.

12/73: Western Association of Independent Campers Annual Meeting
Fresno, CALIFORNIA.

12/73: California Association of Agency Camps Annual Meeting
San Jose, CALIFORNIA.

1974

1/74: Informational Workshop for Community Groups (GSA, Campfire Girls, local and regional parks personnel, etc.)
Berkeley, CALIFORNIA.

2/74: Sunnyvale Unified School District Presentation
Sunnyvale, CALIFORNIA.

3/74: American Camping Association Annual Convention
Atlanta, GEORGIA.

3/74: Bay Area Teachers Informational Presentation
Berkely, CALIFORNIA.

3/74: National Science Teachers Association Annual Convention
Chicago, ILLINOIS.

4/74: National Outdoor Workshop
Florissant, COLORADO.

4/74: Cameron House Summer Camp Workshop
San Francisco, COLORADO.

5/74: OBIS Field Center Directors Orientation Conference
Berkeley, CALIFORNIA.

6/74: Berkeley Parks & Recreation Department Workshop
Berkeley, CALIFORNIA.

6/74: Bay Area Girl Scout Council Presentation
Bothim Camp. Marin County, CALIFORNIA.

6/74: Lawrence Hall of Science Summer Camp Counselors Training Session
Berkeley, CALIFORNIA.

6/74*: Camp Counsellors (Massachusetts Field Center)
Lincoln, MASSACHUSETTS.

6/74*: Members of Fundamental Approach in Science Teaching (Hawaii Field Center)
Honolulu, HAWAII.

6/74*: Marshall Islands District Administrators and Principals Workshop (Hawaii Field Center)
Ratak, MARSHALL ISLANDS.

6/74*: Environmental Education Project Workshop (Hawaii Field Center)
Agana, GUAM.

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* Workshops marked with an asterisk were conducted by community group leaders or Resource Center Directors trained by the OBIS staff.

6/74*: Palau District Administrators and Principals Workshop
(Hawaii Field Center)
Badel Thuap, PALAU.

6/74*: Department of Parks & Recreation Camp Directors Workshop
(Maryland Field Center)
Anne Arundel County, MARYLAND.

6/74*: Biology Teachers of St. Louis County Workshop (Missouri Field
Center)
Gray Summit, MISSOURI.

7/74: Bay Area Teachers Workshop
Berkeley, CALIFORNIA.

7/74*: El Moderna High School Nature Center Workshop (Fullerton, CA.
Field Center)
Villa Park, CALIFORNIA.

7/74*: Girl Scouts of America Leadership Workshop (Fullerton, CA.
Field Center)
Orange County, CALIFORNIA.

7/74*: Walter Knott Nature Center Presentation (Fullerton, CA. Field
Center)
Fullerton, CALIFORNIA.

7/74*: Elementary School Teachers Workshop (Fullerton, CA. Field
Center)
Fullerton, CALIFORNIA.

7/74*: Westmont Nature Center Workshop (Fullerton, CA. Field Center)
Huntington Park, CALIFORNIA.

7/74*: Teacher Training Wrokshop (Massachusetts Field Center)
Harwick, MASSACHUSETTS.

7/74*: Los Angeles Elemntary School Teachers Workshop (Fullerton, CA. Field Center)
Los Angeles, CALIFORNIA.

8/74*: Teacher Training Workshop
Dover, DELAWARE.

8/74*: Girl Scouts of America Leadership Workshop (Florida Field Center)
Tallahassee, FLORIDA.

8/74*: Teacher Training Workshop
Perry, FLORIDA.

8/74*: Docents Workshop, Chesapeake Bay Center for Environmental Studies (Maryland Field Center)
Edgewater, MARYLAND.

8/74*: Community College Teachers Workshop (Hawaii Field Center)
Pago Pago, AMERICAN SAMOA.

9/74*: Girl Scouts of America Leadership Workshop (Fullerton, CA., Field Center)
Fullerton, CALIFORNIA.

9/74*: Boy Scouts of the U.S.A. Leadership Workshop (Florida Field Center)
Tallahassee, FLORIDA.

9/74*: Community Group Leadership Workshop (Fullerton, CA. Field Center)
Fullerton, CALIFORNIA.

9/74*: Orange County Department of Education Workshop (Fullerton, CA. Field Center)
Fullerton, CALIFORNIA.

9/74*: Directors of Massachusetts Sanctuaries Workshop (Massachusetts Field Center)
Lincoln, MASSACHUSETTS.

9/74: San Francisco Bay Area Girl Scout Council Workshop
Bothin Camp, Marin County, CALIFORNIA.

9/74: National Conference on Outdoor Education
Estes Park, CALIFORNIA.

10/74*: Teacher Training Workshop
Grants Pass, OREGON.

10/74*: Audubon Society Workshop (Florida Center)
Ocala, FLORIDA.

10/74*: Barton School Teachers (Fullerton, CA Field Center)
Anaheim, CALIFORNIA.

10/74*: ECO/ED Resident Institute (Missouri Field Center)
Gray Summit, MISSOURI.

10/74*: Community Group Information Workshop (Hawaii Field Center)
Honolulu, HAWAII.

10/74: County Administrators of Outdoor and Environmental Education Conference
Camp Meeker, CALIFORNIA.

10/74*: Girl Scouts of America Leadership Workshop (Ohio Field Center)
Dayton, OHIO.

11/74*: Teacher Training Workshop (Tempe, AZ Field Center)
Tempe, ARIZONA.

11/74: Girl Scouts of America Leadership Training Workshop
Marin County, CALIFORNIA.

11/74: Girl Scouts of America Leadership Training Workshop
Mather AFB, CALIFORNIA.

11/74: Docents Workshop, Environmental Volunteers/Park Rangers of Coyote Point
Coyote Point, CALIFORNIA.

11/74*: Informational Workshop, Pacific Science Center (Washington Field Center)
Seattle, WASHINGTON.

11/74*: McFadden School Presentation (Fullerton, CA Field Center)
Placentia, CALIFORNIA.

11/74*: San Mateo County Parks & Recreation Workshop (Daly City, CA Field Center)
San Mateo, CALIFORNIA.

11/74*: Elementary & Junior High School Teacher Training Workshop (Hawaii Field Center)
Honolulu, HAWAII.

12/74: 4-H Club Executive Board Information Presentation
Berkeley, CALIFORNIA.

12/74: Yosemite Institute Workshop
Yosemite, CALIFORNIA.

12/74*: College Students Workshop
Greeley, COLORADO.

12/74*: GGNRA and National Park Service Workshop (Daly City, CA Field Center)
Yosemite, CALIFORNIA.

1975

1/75*: National Park Service Workshops (Daly City, CA Field Center)
Yosemite, CALIFORNIA.

1/75*: Girl Scout Camp Workshop (Florida Field Center)
Branelon, FLORIDA.

1/75*: Camp-Outdoor Education Staff of YMCA (Daly City, CA Field Center)
La Honda, CALIFORNIA.

1/75*: Girl Scouts of America Leadership Training Workshop (Ohio Field Center)
Dayton, OHIO.

1/75*: Department of Education Personnel & Teachers Workshop (Hawaii Field Center)
Pago Pago, AMERICAN SAMOA.

1/75*: Girl Scouts of America Leadership Training Workshop (Ohio Field Center)
Dayton, OHIO.

1/75: Girl Scouts of America National Community Group Leadership Conference.
Berkeley, CALIFORNIA.

1/75*: Early Childhood Education Specialists Workshop (Florida
Field Center)
Tallahassee, FLORIDA.

2/75: SESAME Graduate Student Group in Science Education
Berkeley, CALIFORNIA.

2/75*: National Science Foundation Directors Meeting (Ohio Field
Center)
Dayton, OHIO.

2/75: American Camping Association Mid-Atlantic Regional Conference
Washington, D.C.

2/75: 4-H Club Regional Awareness Workshop
Salinas, CALIFORNIA.

2/75: Park Rangers & Campfire Girls Workshop
Marin County, CALIFORNIA.

2/75: National Community Group Leadership Workshop
Berkeley, CALIFORNIA.

2/75: National Science Foundation Directors Meeting
Los Angeles, CALIFORNIA.

2/75*: N.W. Florida STEP Conference (Florida Field Center)
Tallahassee, FLORIDA.

2/75*: Community Resources Day (Missouri Field Center)
Gray Summit, MISSOURI.

2/75*: Elementary & Junior High School Teacher Training
(Hawaii Field Center)
Honolulu, HAWAII.

3/75*: Peffer Western Environmental Education Program Workshop (Ohio Field Center)
Dayton, OHIO.

3/75: 4-H Club Awareness Workshop
Sacramento, CALIFORNIA.

3/75: 4-H Club Awareness Workshop
Santa Rosa, CALIFORNIA.

3/75: Environmental Education Class Presentation
Berkeley, CALIFORNIA.

3/75: 4-H Club Regional Awareness Workshop
San Diego, CALIFORNIA.

3/75: American Camping Association Mid-America Regional Meeting
Milwaukee, WISCONSIN.

3/75*: Girl Scouts of America Presentation (Daly City, CA Field Center)
San Francisco, CALIFORNIA.

3/75: 4-H Club, Girl Scouts of America & YWCA Management Personnel
Sequoia Lake, CALIFORNIA.

3/75*: Girl Scouts of America, Campfire Girls & Environmental Volunteers Workshop (Daly City, CA Field Center)
Palo Alto, CALIFORNIA.

3/75: Environmental Education Class Presentation
Berkeley, CALIFORNIA.

3/75*: Washington School District Informational Presentation (Tempe, AZ Field Center)
Tempe. ARIZONA.

3/75*: American Camping Association Workshop (Fullerton, CA Field Center)
Malibu, CALIFORNIA.

3/75: OBIS University Leadership Conference
Berkeley, CALIFORNIA.

3/75: Ukiak Unified School District Presentation
Ukiak, CALIFORNIA.

3/75*: Missouri State Park Board Ranger Training Workshop (Missouri Field Center)
Gray Summit, MISSOURI.

3/75*: Katahdin Region Council-Boy Scouts of the U.S.A. (Maine Field Center)
Bangor, MAINE.

3/75: National Science Teachers Association Presentation
Los Angeles, CALIFORNIA.

3/75: American Camping Association National Leadership Conference
Bradford Woods, INDIANA.

3/75*: Cooperative Extension Service (Maine Field Center)
Augusta, MAINE.

4/75: Sunnyvale Unified School District
Sunnyvale, CALIFORNIA.

4/75*: Community Group Presentation (Maine Field Center)
Bangor, MAINE.

4/75: Bay Area Teachers Workshop
Berkeley, CALIFORNIA.

4/75*: Utah Girl Scout Council Presentation
Salt Lake City, UTAH.

4/75*: STEP Instructors Training Workshop (Florida Field Center)
Fort Walton Beach, FLORIDA.

4/75*: American Camping Association Tri-State Section Workshop
Rock, MISSOURI.

4/75*: Docents Workshop, San Mateo County Jr. Museum (Daly City, CA Field Center)
San Mateo, CALIFORNIA.

4/75*: New England Camping Association (Massachusetts Field Center)
Boston, MASSACHUSETTS.

4/75: American Camping Association Western Regional Conference
Asilomar, CALIFORNIA.

4/75*: National Science Teachers Association (Missouri Field Center)
Kirksville, MISSOURI.

4/75*: Newport Unified School District (Fullerton, CA Field Center)
Newport Beach, CALIFORNIA.

4/75: Girl Scouts of America, San Francisco Council (Daly City, CA Field Center)
Brisbane, CALIFORNIA.

4/75*: Outdoor Education Teachers (Massachusetts Field Center)
Worcester, MASSACHUSETTS.

4/75*: Girl Scouts of America Leadership Training Workshop (Washinton Field Center)
Seattle, WASHINGTON.

4/75: 4-H Club Training Workshop
Asilomar, CALIFORNIA.

4/75: American Camping Association
Asilomar, CALIFORNIA.

4/75*: Girl Scouts of America (Daly City, CA Field Center)
Twin Canyon, CALIFORNIA.

4/75*: Teacher Training Workshop
Memphis, TENNESSEE.

4/75*: Secondary School Science Teachers Training Workshop
(Florida Field Center)
Jacksonville, FLORIDA.

4/75: 4-H Club Awareness Workshop
Red Bluff, CALIFORNIA.

4/75*: Agnew State Hospital Staff Presentation (Daly City, CA Field Center)
Camp Coyote, CALIFORNIA.

4/75: OBIS University Implementation Conference
Berkeley, CALIFORNIA.

4/75*: County Environmental Personnel (Florida Field Center)
Tallahassee, FLORIDA.

4/75*: Baltimore County Secondary School Science Teachers
(Maryland Field Center)
Edgewater, MARYLAND.

4/75*: Campfire Girls (Daly City, CA Field Center)
San Francisco, CALIFORNIA.

4/75: Community Group Informational Meeting (7 groups)
San Francisco, CALIFORNIA.

4/75*: Girl Scouts of America - West Day (Dali City, CA Field Center)
Pescadero, CALIFORNIA.

4/75*: Girl Scouts of America Leadership Training (Washington Field Center)
Seattle, WASHINGTON.

4/75: Modesto School District 7th Grade Teacher Training Workshop
Modesto, CALIFORNIA.

4/75: 4-H Club Training Workshop
Sonoma, CALIFORNIA.

4/75*: Sacramento Girl Scout Troops (Daly City, CA Field Center)
Lodi, CALIFORNIA.

4/75*: Graduate Student Seminar (Massachusetts Field Center)
Amherst, MASSACHUSETTS.

5/75: New Mexico Association for Supervision and Curriculum Development.
Los Alamos, NEW MEXICO.

5/75*: City Teachers & Volunteers (Massachusetts Field Center)
Stamford, CONNECTICUT.

5/75*: Audubon Society Volunteers (Massachusetts Field Center)
Cape Cod, NEW HAMPSHIRE.

5/75*: Association for Environmental & Outdoor Education (Fullerton, CA Field Center)
Monterey, CALIFORNIA.

5/75*: Girl Scouts of America (Fullerton, CA Field Center)
Laguna Miguel, CALIFORNIA.

5/75: 4-H Club Training Workshop
Chico, CALIFORNIA.

5/75*: American Camping Association Workshop (Washington Field Center)
Auburn, WASHINGTON.

5/75: Girl Scouts of America Leadership Training
San Diego, CALIFORNIA.

5/75*: Campfire Girls (Daly City, CA Field Center)
Huddert Park, CALIFORNIA.

5/75*: Girl Scouts of America
St. Louis, MISSOURI.

5/75*: Girl Scouts of America (Daly City, CA Field Center)
Huddert Park, CALIFORNIA.

5/75*: 4-H Club, Scout Troops, School Personnel (Maine Field Center)
Portland, MAINE.

5/75: Community Group Conference
Berkeley, CALIFORNIA.

5/75*: American Camping Association Ecology Counselors
Running Springs, CALIFORNIA.

5/75*: Missouri Science Teachers (Missouri Field Center)
Bennet Springs, MISSOURI.

5/75*: Bangor-Brewer YWCA (Maine Field Center)
Bangor, MAINE.

5/75*: Girl Scouts of America (Missouri Field Center)
Gray Summit, MISSOURI.

5/75*: Boy Scouts of the U.S.A.
Spokane, WASHINGTON.

5/75*: 6th Grade Teachers (Florida Field Center)
Jacksonville, FLORIDA.

5/75*: Pacific Science Center Youth Group Leaders Training
(Washington Field Center)
Seattle, WASHINGTON.

5/75*: STEP Teachers (Florida Field Center)
Perry, FLORIDA.

5/75*: Adult CAmp Counselors Information Workshop
Nashville, TENNESSEE.

6/75*: YWCA Day Camp Counselors (Phoenix, AZ Field Center)
Phoenix, ARIZONA.

6/75*: YMCA Day Camp Counselors (Phoenix, AZ Field Center)
Phoenix, ARIZONA.

6/75*: Oregon Community Groups (Washington Field Center)
Portland, OREGON.

6/75*: Kwajalein Scout Troop Leaders (Hawaii Field Center)
Ratak, MARSHALL ISLANDS.

6/75*: Teachers in Grades 6-8 (Maine Field Center)
Auburn, MAINE.

6/75*: Spokane YMCA Staff (Washington Field Center)
Spokane, WASHINGTON.

6/75*: Recreation Department Education Center (Daly City, CA Field Center)
Huddert Park, CALIFORNIA.

6/75*: 4-H Club Leadership Training (Maine Field Center)
Orano, MAINE.

6/75*: Parks & Recreation Department Leadership Training (Maine Field Center)
Winslow, MAINE.

6/75*: S.W. Washington YMCA Staff (Washington Field Center)
Spirit Lake, WASHINGTON.

6/75*: National Park Service (Washington Field Center)
Longmire, WASHINGTON.

6/75*: Girl Scouts of America Training Workshop (Washington Field Center)
Columbia, WASHINGTON.

6/75*: Girl Scout Council of Pacific Peaks (Washington Field Center)
St. Albions Camp, WASHINGTON.

6/75*: Adult Leaders of Summer Recreation Programs (Maine Field Center)
Bangor, MAINE.

6/75*: Adult Leaders - Campfire Girls (Maine Field Center)
Scarkio, MAINE.

6/75*: University of Washington Biology Students (Washington
Field Center)
Seattle, WASHINGTON.

6/75*: Columbia River Girl Scout Council (Washington Field Center)
Portland, OREGON.

6/75: 4-H Club Training Workshop
Fresno, CALIFORNIA.

7/75*: Whitworth College Teachers (Washington Field Center)
Spokane, WASHINGTON.

8/75*: Montgomery County Teachers (Maryland Field Center)
Camp Letts, MARYLAND.

8/75: Girl Scouts of America Leadership Training
Santa Clara, CALIFORNIA.

8/75*: Teachers, Administrators & Peace Corps Volunteers
(Hawaii Field Center)
Yap, WESTERN CAROLINE ISLANDS.

8/75*: Coordinators of the School of Environmental Education
Florida Field Center)
Ocala, FLORIDA.

8/75*: Instructors at Live Oak Vocational School (Florida Field
Center)
Live Oak, FLORIDA.

9/75*: Anne Arrundel City Teachers (Maryland Field Center)
Arlington, VIRGINIA.

9/75: 8-County Conference of 4-H Clubs
Anaheim, CALIFORNIA.

1976

1/30-2/1/76: OBIS National Implementation Conference I
Berkeley, CALIFORNIA.

2/17-21/76: American Camping Association Mid-Atlantic Meeting
Washinton, DC.

2/19/76: 4-H Club Awareness Workshop
Salinas, CALIFORNIA.

2/27-3/1/76: OBIS National Implementation Conference II
Berkeley, CALIFORNIA.

3/3/76: 4-H Club Regional Awareness Workshop
Sacramento, CALIFORNIA.

3/4/76: 4-H Clyb Regional Awareness Workshop
Santa Rosa, CALIFORNIA.

3/5-7/76: American Camping Association Mid-America Meeting
Milwaukee, WISCONSIN.

3/6/76: 4-H Club Regional Awareness Workshop
San Diego, CALIFORNIA.

3/17-19/76: OBIS University Implementation Conference I
Berkeley, CALIFORNIA.

3/22/76: National Science Teachers Association Convention
Philadelphia, PENNSYLVANIA.

3/20/76: Expanding Your Horizons Conference for High School Women
Oakland, CALIFORNIA.

3/24/76: American Camping Association Annual Convention
Fort Wayne, INDIANA.

4/3-5/76: American Camping Association New England Regional Meeting
Boston, MASSACHUSETTS.

4/9-12/76: American Camping Association Western Regional Meeting
Asilomar, CALIFORNIA.

4/12/76: 4-H Club "5-County Conference" Workshop
Asilomar, CALIFONIA.

4/16/76: 4-H Club Awareness Workshop
Red Bluff, CALIFORNIA.

4/17-19/76: OBIS University Implementation Conference II
Berkeley, CALIFORNIA.

4/22/76: Camp Fire Girls Special Project
San Francisco, CALIFORNIA.

4/28/76: 4-H Club Trainers Workshop
Santa Rosa, CALIFORNIA.

5/8/76: 4-H Regional Awareness Workshop
Fresno, CALIFORNIA.

5/13/76: 4-H Club Trainers Workshop
Sacramento, CALIFORNIA.

5/20/76: Girl Scouts of America Trainers Workshop
San Diego, CALIFORNIA.

6/12-18/76: Mini-Corps Training Workshop
Lodi, CALIFORNIA.

8/7/76: U.S. Forest Service Training Workshop
Squaw Valley, COLORADO.

10/15-18/76: National Association of Biology Teachers Annual Convention
Denver, COLORADO.

10/11/76: Oakland Junior League Workshop
Oakland, CALIFORNIA.

10/24-25/76: National Marine Education Conference
Asilomar, CALIFORNIA.

10/28/76: Association of Environmental and Outdoor Educators Annual Convention
Santa Cruz, CALIFORNIA.

12/9/76: National Science Teachers Asssociation Western Regional Meeting
Seattle, WASHINGTON.

1977

2/13/77: American Camping Association, Southern Regional Meeting
Natchez, MISSISSIPPI.

3/15/77: Pt. Reyes National Seashore Training Program
Pt. Reyes, CALIFORNIA.

3/24/77: Bay Area Environmental Education Resource Fair, Annual
Hayward, CALIFORNIA.

4/19/77: Stalking Education in the Wild Conference
Greeley, COLORADO.

6/5/77: Mini-Corps Training Workshop
Castro Valley, CALIFORNIA.

10/13-16/77: National Science Teachers Association, Western Regional Meeting
San Francisco, CALIFORNIA.

10/20-23/77: National Association of Biology Teachers, Annual Convention
Anaheim, CALIFORNIA.

11/21-24/77: Fifth Annual Conference on Experiential Education
Asilomar, CALIFORNIA.

1978

2/28/78: American Camping Association, National Conference
Anaheim, CALIFORNIA.

3/11/78: Bay Area Environmental Education Resource Fair II, Annual
Oakland, CALIFORNIA.

4/7-11/78: National Science Teachers Association, National Conference
Washington, DC.

1979

3/21-24/79: National Science Teachers Association, National Convention
Anaheim, CALIFORNIA.

3/29/79: Craig Unified School District
Craig, COLORADO.

4/20/79: California Science Teachers Association
San Jose, CALIFORNIA.

8/6-7/79: Region XXVII: Department of Migrant Education
Lubbock, TEXAS.

10/12/79: National Science Teachers Association, Western Regional Meeting
Portland, OREGON.

10/26/79: National Association of Biology Teachers, Annual Meeting
New Orleans, LOUISIANNA.

10/26/79: National Science Teachers Association, Hartford Area Convention
Hartford, CONNECTICUT.

11/9/79: Lutheran Church of America
Felton, CALIFORNIA.

11/29/79: National Science Teachers Association, Midwest Regional Meeting
St. Louis, MISSOURI.

12/4/79: Yosemite Institute - Headlands Camp
Yosemite, CALIFORNIA.

1980

3/15/80: BAEER Fair IV (Bay Area Environmental Education Resource Fair), Annual Meeting
San Jose, CALIFORNIA.

3/21/80: National Science Teachers Association, Annual Meeting
Anaheim, CALIFORNIA.

4/19/80: Elementary School Science Association, Spring Conference
Santa Cruz, CALIFORNIA.

5/25-27/80: National Association for Environmental Education
Alburquerque, NEW MEXICO.

APPENDIX D

Project Publications

APPENDIX D

Project Publications

OBIS Activities (Available at cost)

Set I: 24 outdoor biology activities.

Set II: 24 outdoor biology activities.

Set III: 24 outdoor biology activities.

Set IV: 24 outdoor biology activities.

Trail Module: 4 activities dealing with soil management and environmental impact of man-made trails.

Mini-Corps Version en Español: 20 OBIS activities modified for summer enrichment program for migrant farmworkers' children and translated into Spanish; "Languague Development" Section added.

Mini-Corps English-Spanish Version: 20 activities (above) also modified for bilingual activities emphasizing basic language skill development in English with science concepts presented in native language.

American Camping Association Camp Kit: 29 activities selected from OBIS Sets I and II to meet the camp activity needs of the association.

Lawn Guide: 25-page guide for identifying organisms found in and around lawn habitats; Bilingual Mini-Corps versions entitled *Guía Para El Prado.*

Pond Guide: 25-page guide to aid participants to identify organisms found in and around ponds; Bilingual Mini-Corps version entitled *Guía Para El Estanque*.

Project Informational Materials (distributed free of charge)

OBIS Newsletter: Newsletters were published in 4-6, or 8-page editions in winter & fall '74; winter and fall '75; January, June, and December '76; June '77; January '78; February & October '79; and March '80.

Primer: How To Lead an OBIS Workshop: Pamphlet describing procedures and techniques for organizing, and conducting information workshops on OBIS.

OBIS Story: 25-page prospectus on the OBIS Project describing the OBIS philosophy and approach to activity development, how OBIS activities can be used, when and where to conduct activities, descriptions of available activities, and how to avail oneself of resources available to groups interested in using OBIS.

OBIS NEWSLETTER ARTICLES

Fall, 1974: Contains articles on OBIS Field Centers, OBIS at camp, OBIS joins the Girl Scouts, OBIS goes beachcombing, how to make a "getter," available trial editions, and order forms.

Winter, 1974: Contains discussion of what OBIS is and how it explores a variety of approaches, article on the Lawn Unit, article on POND ecology, discussion of evaluation of OBIS units, and a discussion of the new unit, "Who Goes There?"

Fall, 1975: Contains listing of OBIS Trial Edition, Set II, changes in OBIS due to feedback order form, and an article about the new dimension OBIS has given to scouting written by a Girl Scout Program Director.

Winter, 1975: Contains discussion of OBIS in Florida and Seattle, listing of Trial Edition Set I, list of OBIS Field Centers and Directors and 12 new NSF grants given across the country for OBIS Implementation.

January, 1976: Contains discussion of the Junior League and OBIS, the new Trail Module, OBIS at Conventions, Girl Scout evaluation of OBIS, new module "Can Fishing," and listing of materials.

June, 1976: Contains discussion of how existing programs use OBIS, listing of OBIS materials, OBIS's role in Earth Week in Kansas, feedback from users, new resource centers, recent changes, and order form.

December, 1976: Contains discussion of OBIS and Migrant Education camps (Mini-Corps), development of activities in Idaho, and an article about using OBIS with high school students.

June, 1977: Contains a listing and description of Set III folios, description of OBIS and workshops given, a listing of a number of organizations who use OBIS, and an article by a teacher who uses OBIS for term projects.

January, 1978: Contains descriptions of development trips to Arizona and North Carolina, a report on the Mini-Corps Packet, and an article describing workshops by the University of Houston.

February, 1979: Contains information about the commercial publication of the OBIS materials, a description of the OBIS film, a status report of the OBIS project, and a description of Trial Edition Set IV.

October, 1979: Contains announcement of first commercial modules, reports on the use of OBIS in the inner-city of Baltimore, Maryland, and the use of OBIS/Mini-Corps in Lubbock, Texas.

and an announcement concerning the OBIS Resource Center Network.

February, 1980: Contains reports on the use of OBIS with the visually impaired, and with youngsters aged five to ten; a report of a paper presented to the AAAS convention concerning informal education; and an announcement of a new mailing list.

JOURNAL ARTICLES

Booth, Gerald, "Learning at Lawrence," American Education, March, 1979, pp. 41-47. Includes description of the activity development process used by the SAVI, HAP, and OBIS projects.

Buller, Dave, "OBIS and ACA - the Impossible Equation Does Match," Camping Magazine, April, 1977, pp. 10-11. Includes description of OBIS/ACA kits and how kit was developed.

Chen, Benjamin et al, "Problems in the Adaptation of Nonformal Study Programs to the Israeli Education System," Science Education, Vol. 63, No. 5, pp. 705-713. 1979.

DeLucchi, Linda, "Enrich Your Outdoor Program with OBIS," Nature Study 30 (2): 9-10. Article describes OBIS, how some groups use OBIS activities, examples of activities, and how to order sets.

Falk, J.H., "Outdoor Education: A technique for Assessing Student Behavior," School Science and Mathematics, Vol 76, No. 3, March, 1976, pp. 225-230.

Falk, J., L. Malone, and M. Linn, "Outdoor Biology Instructional Strategies: Development and Evaluation," American Biology Teacher, March, 1975, pp. 162-173. Article contains a description of the three plases of development of OBIS activities, OBIS evaluation philosophy, and a more thorough coverage of the development and evaluation of the "Lawn Unit."

Fisher, J.W., "An Encounter with OBIS," SASTA, July, 1976, pp. 47-48. Fisher, from Wattle Park Teachers Centre, participated in an OBIS workshop in February, 1975 and describes what he experienced and his opinions of OBIS.

Jiran, J., "What's an OBIS Doing at Camp Ozone," Tennessee Conservationist, Vol. XLII, May, 1976, No. 4. Description of OBIS workshop held for camp councellors by Nat. Camping Assoc., at Camp Ozone, Tennessee.

McCormack, Alan J., "OBIS: The Science Un-Curriculum," Learning, 3(2): 62, Nov., 1974. Article describes where OBIS activities are planned for, how they have universal applicability, and contains a listing of sample activities.

Murtha, Kathleen T., "OBIS + Kids = Activity," American Biology Teacher, Vol. 39 (7), October, 1977, pp. 439, 454. Describes OBIS approach and usefulness of incorporating OBIS in the classroom.

Richardson, N., "Just Add Water," *Journal of Marine Education*, Summer, 1976, pp. 20-24. Contains diecussion of adaptation of OBIS activities by Mariner Girl Scouts for tiedpool and beach exploration.

Sanford, Julie P., "Biology in the School Lot," *The Science Teacher*, Vol. 45 (2), February, 1978, pp. 24-25. Points out aspects of the OBIS program that make it exciting and adaptable to the school setting.

Thier, H.D. and A.J. McCormack, "Outdoor Biology Instructional Strategies," peper presented to Natural Science for Youth Foundation Conference, December, 1973. Contains description of what OBIS is and is not, and descriptions of units currently under development.

Thomas, Barry, "Environmental Ed for the Blind," *Instructor*, May, 1977, pp. 106-107. Contains descriptions of OBIS activities and how they were used with blind students in a camp setting.

SHORT ARTICLES OR CITATIONS

Abruscato, J. and J. Hassard, *Loving and Beyond*: Science Teaching for the Humanistic Classroom, Goodyear Publ. Co., 1976. Book containing a table on p. 14 which lists curriculum projects for the reader to explore, and includes OBIS.

Conservation and Environmental Studies Center, "Free Environmental Education Workshops," Brown Mills, N.J. Contains timetable of workshops and description of OBIS.

______________________________, "We Want You to Win with OBIS," Brown Mills, N.J. Short article stating if the reader has used OBIS materials and answers four questions, he/she may win a prize.

Environmental Education Report, "OBIS: Biology Outdoors and Out of School,: Oct., 1974, p. 9. Contains description of OBIS, its goals, audience, materials, history.

____________________, "OBIS," Dec./Jan. 1976, Vol 4(1): 11. Very short description of OBIS activities.

____________________, "Dissemination Come True," May, 1976, p. 9. Discusses how OBIS disseminated environmental education materials.

Gastonia Gazette, "Research Biologists Develop Outdoor Biology Activities, October 9, 1977. Gives brief background on OBIS and description of development trip to North Carolina forest by OBIS authors.

Gunn, B., "OBIS," Junior League Viewpoint, March, 1976, p. 17. Description of OBIS training session for Junior League members at LHS, followed by members bringing OBIS to three Oakland Public High Schools.

Hagle, Antonia, "OBIS Feedback," Junior League Viewpoint, February, 1977, pp. 16-17. Describes continuing program of Junior League volunteers in East Bay Schools.

Kennedy, Dorothy E., "O-B-I-S...An Adventure...," Girl Scout Leader, March/April, 1977, pp. 18-20. Describes how a leader could incorporate OBIS into the Girl Scout program.

Laetsch, W.M., "OBIS," Science and Curricular Developments, 9th Report, 1974. Short description in government publication of OBIS activities, purpose, and audience.

Learning, "Resource List," Jan., 1976, p. 25. Listed on the Resource List for students grades 6-9 is a citation of OBIS.

National Intercom, (Boy Scout Newsletter), "Workshop to be Held Here," Nov., 1975, p. 2. Discussion of OBIS workshop held Nov. 22, 1975.

Phoenix Gazette, "Berkeley Team Kid-Tests Ideas in the Desert," November 2, 1977. Newspaper article which describes development trip to Arizona desert by OBIS authors.

Rensel, Jan, "Hybrids, Creative Combinations of Curriculum Materials," Branch 4, (Project Learning Tree). Combines Project Learning Tree and OBIS by related lessons.

Salinas Californian, "4-H Club's OBIS Opens Young Eyes," April 14, 1976, p. 29. This newspaper article describes the week-long intensive training program for 4-H members using OBIS activities in Salinas, California.

Science Education News, "OBIS Set IV Trial Edition Completed," Summer/Fall, 1979. Briefly describes LINC program which involves inner city students with OBIS activities.

Scouting Around, "OBIS: Exploring Your World," May/June, 1976, p. 6. Bulletin article which describes OBIS in the San Fernando Girl Scout Council.

PROGRAMS WHICH INCLUDE OBIS ACTIVITIES

Callagan, Sara S., "Teacher's Activity Guide to Coastal Awareness," Marine Bulletin Number 23, University of Rhode Island, 1977. Used OBIS in a program studying the coast of Rhode Island.

Discovering the Forest, North Carolina Department of Natural Resources and Community Development. Uses shortened OBIS format and

several OBIS activities in a packet of forty activityes dealing with the forest environment.

Lasswell, Patrick and Barry Thomas, "Live in the Chaparral," *Tucker Wildlife Sanctuary Nature Series*, No. 8, 1975. Gives specific information about chaparral organisms that illustrate a general concept, then identifies related OBIS activities.

APPENDIX E

Module and Activity List: Commercial Edition.

APPENDIX E

Module Acitity List: Commercial Edition.

OBIS ACTIVITIES

A Better Fly Trap. The youngsters investigate the behavior of flies and construct fly traps from milk cartons.

Acorns. By playing a survival game, the youngsters compare the winter food-storage strategies of squirrels.

Animal Anti-Freeze. In this activity, the students search for a hibernation site that will protect a make-believe animal from freezing.

Animal Diversity. Using sweep nets, the youngsters sample and compare the insects living in two different areas: a managed lawn and a weedy area.

Animal Movement in Water. In this introductory activity, the participants use sweep nets to sample the variety of animals living in lawns.

Ants. The children investigate the behavior of ants.

Attention! To explore visual communication, each youngster creates an eye-catching design intended to attract a specific member of the group.

Attract a Fish. The youngsters explore the behavior of minnows by "fishing" with a variety of potential baits and lures.

Beachcombing. The beachcombers search for evidence of animal and plant life on a sandy beach and speculate on the origins of their finds.

Beach Zonation. In this activity, the participants investigate the distribution of organisms in a rocky intertidal zone.

Bean Bugs. In this simulation activity, the children learn how to census a population of organisms too numerous to count.

Birdfeeder. The students construct birdfeeders and set them up at home, at school, or at camp. For a week or two, the youngsters investigate bird behavior.

Bird Nests. After constructing bird nests, the youngsters place the nests in their site and try to locate and identify each others' nests.

Bugs, Worms & Others. The teams invent populations of make-believe organisms and then investigate real populations living in their activity site.

Cactus Wheel. With a simple hunt-and-walk technique, the youngsters determine the population densities of several desert plants.

Can Fishing. By going "can fishing," the students discover the kinds of aquatic organisms that live in and on submerged cans.

Cardiac Hill. Using heart reate as an indicator, the youngsters establish the maximum steepness for a foot path.

Clam Hooping. The participants conduct a population census of squirting clams on a beach or mudflat, and investigate the clams' natural history.

Cool It. By taking advantage of the temperature variations in their site, the youngsters try to keep their "thermometer lizards" from overheating or getting too cold.

Crawdad Grab. The youngsters explore crawdad behavior by building crawdad traps and "fishing."

Creepers and Climbers. The participants investigate specialized climbing structures and growth patterns of different vines.

Damsels and Dragons. The youngsters investigate damselfly and dragonfly perching behavior, and discover how these "D-flies" react to flying decoys.

Desert Hunt. In this introduction to the desert, the teams design OBIS scavenger hunts for each other.

Desert Water Keepers. The youngsters experiment with paper leaf models to find out how different desert plants conserve water.

Envirolopes. Envirolope challenges direct the participants to hunt for a variety of textures, colors, odors, and evidence of organisms in the activity site.

Environmental Sun Prints. The youngsters make photogram records of plants, plant parts, animals, or non-living objects in their environment.

Flocking to Food. Using a variety of "beaks" (trowels, spoons, sticks), the participants hunt for organisms that a bird might eat.

Flower Powder. The youngsters use artificial bees and paper models of flowers to find out how bees transfer pollen from one flower to another.

Fly a Leaf. By "flying" and recing leaves along lines, the participants find out which leaves catch more wind.

Follow the Scent. Using scent markers to delineate home territories the youngsters discover one way animals use their sense of smell.

Food Chain Game. In this activity, the youngsters investigate *food chains* by assuming the roles of animals that are part of a food chain.

Food Grab. The youngsters design devices that can capture prey or gather plants. After testing their devices, the youngsters investigate the food-gathering adaptations of animals in their activity site.

For the Birds. The youngsters investigate bird behavior by feeding pigeons, ducks, jays, sparrows, or sea gulls.

Gaming in the Outdoors. By going on a modified scavenger hunt, participants increase their awareness of the variety in their environment.

Great Streamboat Race. The participants enter cork boats in the Great Streamboat Race to discover the rate and direction of currents in a stream.

Habitats of the Pond. In this activity, teams hunt for organisms in different areas of a pond or lake. The term *habitat* is introduced.

Hold a Hill. The students investigate the relationship between erosion and slope.

Hold It. After making a cork or sponge "creature" that can hold on against water current, the participants investigate the holding adaptations of real organisms.

Hopper Circus. Action Cards challenge the students to investigate the behaviors of hopping animals (beach hoppers, grasshoppers, frogs, and others).

Hopper Herding. The youngsters round up a "herd" of hopping insects (grasshoppers, crickets, and katydids) and find out how many different kinds are in their herd.

How Many Organisms Live Here? Using homemade sampling gear, the youngsters estimate the numbers of organisms living in a small section of a pond.

Invent an Animal. The youngsters design "animals" that blend into local habitats and then search for other youngsters' "animals."

Invent a Plant. The youngsters construct models of plants that are adapted to living under specific environmental conditions.

Isopods. The students investigate two kinds of isopods for differences in structure and behavior.

Jay Play. After discovering the food-color preference of jays, the students try to change this preference by salting the food of the color.

Junk-in-the-Box. The youngsters discover which kinds of man-made litter provide animals with food or shelter. The youngsters are then asked to make a value judgement about litter.

Leaf Living. The students hide and navigate in a kid-sized pile of leaves to experience the environment of animals that live in fallen leaves.

Leapin' Lizards. By using a special "lizard rig," the youngsters investigate lizard feeding behavior and interactions.

Lichen Looking. The youngsters search for lichens and learn about their habitats, shapes, and colors.

Litter Critters. After searching for small animals living in the ground, the youngsters use their OBIS Litter Critter Wheels to "match" the catch.

Logs to Soil. After cutting through and investigating rotten logs, the teams make log-profile puzzles for each other.

Mapping a Study Site. Using a mapping technique, the youngsters familiarize themselves with the major features of their activity site.

Metric Capers. The youngsters use metric units of measurement to measure various objects in their environment.

Moisture Makers. The participants test different kinds of leaves with cobalt chloride paper. The paper's color changes allow the youngsters to compare the amounts of moisture released from different leaves.

Mystery Marauders. After gathering evidence that plants in the site are being eaten, the youngsters try to identify the plant eaters.

Night Eyes. Using flashlights, the participants locate and identify mysterious eyes in the night.

Night Shine. The youngsters search for aquatic animals that are active at night, and then investigate the animals' responses to light.

OBIS Oil Spill. Using popcorn to simulate an oil spill, the students estimate the "spill's" impact on the environment.

Out of Control. The youngsters release a portion of a lawn from human control and then observe the resulting changes over the next few months.

Pigment Puzzles. The students use chromatography to explore leaf and flower colors, and to solve natural "pigment puzzles."

Plant Hunt. The youngsters collect and sort leaf samples to determine how many *species* of plants grow in the activity site.

Plant Patterns. By mapping the location of plants in an area, the youngsters investigate the distribution patterns and relationships of plants.

Plants Around a Building. The youngsters discover how the environment around a building affects the growth of plants.

Population Game. In a feeding game, the youngsters find out how many deer can survice in a herd's "home range."

Rock Pioneers. After placing bare rocks in the intertidal zone, the youngsters keep track of the plants and animals that colonize the rocks over a period of weeks.

Roots and Shoots. The youngsters try to identify two "mystery plants" by digging up weeds and comparing their roots to those of the unidentified plants.

Salt Water Revival. During a low tide, the youngsters create an artificial high tide and observe its effects on marine animals.

Sawing Away. After sawing sections from fallen logs, the youngsters count tree rings and study the patterns of tree growth.

Scent Tracking. Using spray misters and liquid extract to simulate prey scents, the kids play a game in which predators track a prey by following its scent.

Scram or Freeze. After being introduced to "scram" and "freeze" escape behaviors in a game, the kids investigate the escape behaviors of animals that live under logs and rocks.

Seas in Motion. Using tennis balls, water balloons, and other simple devices, the participants investigate the escape behaviors of animals that live under logs and rocks.

Seed Dispersal. In this activity, the youngsters modify seeds and fruits for dispersal by various natural forces. The youngsters then find out how local seeds are adapted for dispersal.

Sensory Hi-Lo Hunt. The students use *only* their senses to find the extremes of several environmental variables: wind, temperature, light, slope, and moisture.

Shake It! The youngsters try to find a community that matches a "mystery community" by shaking the animals out of different trees and shrubs.

Silent Stalking. By playing a nighttime game, the participants explore the importance of silent stalking skills to predators and the importance of sound detection to prey.

Snug as a Bug. The youngsters make homes for imaginary insects, and then search for actual animals' constructions in and on leaves.

Sound Off! The youngsters pretend to be animals that communicate by sound and try to find their secret partners before being "captured" by a "predator." After this game, the youngsters listen to real animals.

Sticklers is a simulation game that introduces youngsters to the concepts of *habitat* and *distribution*. After the game, the youngsters discover where real organisms live and how they are distributed.

Super Soil. The youngsters use a simple alum-profile test to compare local soils with a commercial garden mix for organic content.

Swell Homes. The youngsters locate "swell homes" (galls) on plants and find out what lives in those homes.

Terrestrial Hi-Lo Hunt. The youngsters search for the warmest and coolest, windiest and calmest, wettest and driest, and brightest and darkest spots in an area. The youngsters also look for differences between the plants and animals that live in the Hi-Lo spots.

The Old White Sheet Trick. By attracting night-flying insects to a brightly lit surface and conducting other light-related experiments, the youngsters discover how light affects insects' behavior.

Too Many Mosquitoes. The youngsters learn about biological control by finding predators that eat mosquito larvae.

Trail Construction. The youngsters select the best trail-construction technique for their site.

Trail Impact Study. Teams attempt to lay out the coursr of a foot path that will have the least amount of impact on the environment.

Tree Tally. Using the OBIS transect, the youngsters find the most common tree in a forest.

Variation Game. By playing simple games, the youngsters investigate variations between individuals.

Water Breathers. The students investigate the currents created by aquatic animals when they breathe and move.

Water Holes to Mini-Ponds. The students observe and compare changes that take place in fertilized and unfertilized water holes. This activity requires regular visits to monitor the water holes for eight to ten weeks.

Water Snails. By marking, releasing, and later recapturing water snails, the youngsters discover the snails' preferred habitats.

Water Striders. The children explore the movement and feeding behavior of water striders.

Web It. With the aid of spray misters, straws, and sweep nets, the students investigate the behavior of spiders.

Web Weavers. The children use string art to reproduce the intricacies of different spider webs.

What Lives Here? In this introductory activity, the youngsters observe and identify plants and animals that live in an aquatic site.

Who Goes There? In this nighttime activity, the kids use a portable flashlight and fluorescent bait to find evidence of animals that live in an aquatic site.

Wintergreen. The participants find green plants under the snow and determine the light and temperature conditions around those plants.

OBIS MODULES

OBIS SAMPLER
Now Available

Food Chain Game
Seed Dispersal
Sticklers
Water Breathers

ADAPTATIONS
Now Available

Animal Movement in Water
Desert Water Keepers
Food Grab
Hold It
Invent an Animal
Invent a Plant
Seed Dispersal

ANIMAL BEHAVIOR
Available June, 1981

Ants
For the Birds
Isopods
Jay Play
Leapin' Lizards
Scram or Freeze
The Old White Sheet Trick
Web It

AQUATIC ANIMAL BEHAVIOR
Available June, 1981

Animal Movement in Water
Attract a Fish
Damsels and Dragons
Hopper Circus
Salt Water Revival
Water Breathers
Water Striders

BACKYARD
Now Available

Birdfeeder
Flower Powder
Food Grab
Invent an Animal
Isopods
Sticklers
Super Soil
Water Holes to Mini-Ponds

BIO-CRAFTS
Now Available

Attention!
Bird Nests
Bugs, Worms & Others
Environmental Sun Prints
Food Grab
Invent an Animal
Invent a Plant
Seed Dispersal
Web Weavers

BREAKWATERS AND BAYS
Available August, 1981

Beach Zonation
Clam Hooping
Crowded Grab
Flocking to Food
OBIS Oil Spill
Rock Pioneers
Water Breathers

CAMPSITE
Available August, 1981

A Better Fly Trap
Ants
Jay Play
Silent Stalking
The Old White Sheet Trick
Who Goes There?

CHILD'S PLAY
Available March, 1981

Attention!
Envirolopes
Food Grab
Gaming in the Outdoors
Sound Off!
What Lives Here?
Web Weavers

DESERT
Now Available

Cactus Wheel
Cool It
Desert Hunt
Desert Water Keepers
Leapin' Lizards
Lichen Looking
Terrestrial Hi-Lo Hunt
Water Holes to Mini-Ponds

FOREST
Available December, 1981

Jay Play
Leaf Living
Lichen Looking
Litter Critters
Logs to Soil
Sowing Away
Tree Tally

FOR EIGHT- TO ELEVEN-YEAR-OLDS
Available March, 1981

Ants
Attract a Fish
Bugs, Worms & Others
Great Streamboat Race
Invent an Animal
Isopods
Junk in the Box
Plant Hunt
Scram or Freeze

FOR LARGE GROUPS
Available March, 1981

Acorns
Food Chain Game
Invent an Animal
Population Game
Silent Stalking
Sound Off!

FOR SMALL GROUPS AND FAMILIES
Available March, 1981

A Better Fly Trap
Ants
Attract a Fish
Birdfeeder
Damsels and Dragons
Great Streamboat Race
Leaf Living
Leapin' Lizards

GAMES AND SIMULATIONS
Available March, 1981

Cool It
Flower Powder
Follow the Scent
Food Chain Game
Population Game
Sticklers
Variation Game

HUMAN IMPACT
Available August, 1981

Can Fishing
Junk-in-the Box
OBIS Oil Spill
Out of Control
Plants Around a Building
Too Many Mosquitoes
Trail Impact Study

LAWNS AND FIELDS
Available December, 1981

Animal Diversity
Animals in a Grassland
Hopper Herding
Mystery Marauders
Plant Hunt
Roots and Shoots
Silent Stalking
Web It
Web Weavers

NEIGHBORHOOD WOODS
Available December, 1981

Bird Nests
Creepers and Climbers
Lichen Looking
Mystery Marauders
Sensory Hi-Lo Hunt
Shake It!
Snug as a Bug
Swell Homes

NIGHTTIME
Available August, 1981

Night Eyes
Night Shine
Silent Stalking
Sound Off!
The Old White Sheet Trick
Web It
Who Goes There?

OUTDOOR STUDY TECHNIQUES
Available December, 1981

Bean Bugs
Fly a Leaf
How Many Organisms Live Here?
Mapping a Study Site
Moisture Makers
Pigment Puzzles
Plant Patterns
Shake It
Water Snails
Who Goes There?

PAVEMENT AND PARKS
Available Now

Ants
Envirolopes
Environmental Sun Prints
For the Birds
Junk-in-the-Box
Plant Hunt
Plants Around a Building
Sound Off!

PONDS AND LAKES
Available June, 1981

Animal Movement in Water
Attract a Fish
Can Fishing
Habitats of the Pond
Too Many Mosquitoes
Water Breathers
Water Holes to Mini-Ponds
What Lives Here?

SCHOOLYARD
Available Now

A Better Fly Trap
Food Chain Game
Invent a Plant
Metric Capers
Seed Dispersal
Sticklers
Terrestrial Hi-Lo Hunt

SEASHORE
Available June, 1981

Animal Movement in Water
Beachcombing
Hopper Circus
Salt Water Revival
Seas in Motion
Water Breathers

STREAMS AND RIVERS
Available December, 1981

Crowded Grab
Damsels and Dragons
Great Streamboat Race
Hold It
OBIS Oil Spill
Water Snails
Water Striders
What Lives Here?

TRAIL
Available December, 1981

Cardiac Hill
Gaming in the Outdoors
Hold a Hill
Shake It!
Trail Construction
Trail Impact Study

WINTERTIME
Available December, 1981

Acorns
Animal Anti-Freeze
Birdfeeder
Population Game
Scent Tracking
Wintergreen

NOTE: DATES LISTED ARE PROJECTED AVAILABILITY

OBIS SAMPLER

Food Chain Game	**Now**
Seed Dispersal	**Available**
Sticklers	
Water Breathers	

ADAPTATIONS

Animal Movement in Water	**Now**
Desert Water Keepers	**Available**
Food Grab	
Hold It	
Invent an Animal	
Invent a Plant	
Seed Dispersal	

ANIMAL BEHAVIOR

Ants	**Available**
For the Birds	**June, 1981**
Isopods	
Jay Play	
Leapin' Lizards	
Scram or Freeze	
The Old White Sheet Trick	
Web It	

AQUATIC ANIMAL BEHAVIOR

	Available
Animal Movement in Water	**June, 1981**
Attract a Fish	
Damsels and Dragons	
Hopper Circus	
Salt Water Revival	
Water Breathers	
Water Striders	

BACKYARD

Birdfeeder	**Now**
Flower Powder	**Available**
Food Grab	
Invent an Animal	
Isopods	
Sticklers	
Super Soil	
Water Holes to Mini-Ponds	

BIO-CRAFTS

Attention!	**Now**
Bird Nests	**Available**
Bugs, Worms & Others	
Environmental Sun Prints	
Food Grab	
Invent an Animal	
Invent a Plant	
Seed Dispersal	
Web Weavers	

BREAKWATERS AND BAYS

Beach Zonation	**Available**
Clam Hooping	**August, 1981**
Crowded Grab	
Flocking to Food	
OBIS Oil Spill	
Rock Pioneers	
Water Breathers	

CAMPSITE

A Better Fly Trap	**Available**
Ants	**August, 1981**
Jay Play	
Silent Stalking	
The Old White Sheet Trick	
Who Goes There?	

CHILD'S PLAY

Attention!	**Available**
Envirolopes	**March, 1981**
Food Grab	
Gaming in the Outdoors	
Sound Off!	
What Lives Here?	
Web Weavers	

DESERT

Cactus Wheel	**Now**
Cool It	**Available**
Desert Hunt	
Desert Water Keepers	
Leapin' Lizards	
Lichen Looking	
Terrestrial Hi-Lo Hunt	
Water Holes to Mini Ponds	

FOREST

Jay Play	**Available**
Leaf Living	**December, 1981**
Lichen Looking	
Litter Critters	
Logs to Soil	
Sowing Away	
Tree Tally	

FOR EIGHT- TO ELEVEN-YEAR-OLDS

	Available
Ants	**March, 1981**
Attract a Fish	
Bugs, Worms & Others	
Great Streamboat Race	
Invent an Animal	
Isopods	
Junk-in-the-Box	
Plant Hunt	
Scram or Freeze	

FOR LARGE GROUPS

Acorns	**Available**
Food Chain Game	**March, 1981**
Invent an Animal	
Population Game	
Silent Stalking	
Sound Off!	

FOR SMALL GROUPS AND FAMILIES

	Available
A Better Fly Trap	**March, 1981**
Ants	
Attract a Fish	
Birdfeeder	
Damsels and Dragons	
Great Streamboat Race	
Leaf Living	
Leapin' Lizards	

GAMES AND SIMULATIONS

Cool It	**Available**
Flower Powder	**March, 1981**
Follow the Scent	
Food Chain Game	
Population Game	
Sticklers	
Variation Game	

HUMAN IMPACT

Can Fishing	**Available**
Junk-in-the-Box	**August, 1981**
OBIS Oil Spill	
Out of Control	
Plants Around a Building	
Too Many Mosquitoes	
Trail Impact Study	

LAWNS AND FIELDS

Animal Diversity	**Available**
Animals in a Grassland	**December, 1981**
Hopper Herding	
Mystery Marauders	
Plant Hunt	
Roots and Shoots	
Silent Stalking	
Web It	
Web Weavers	

NEIGHBORHOOD WOODS

Bird Nests	**Available**
Creepers and Climbers	**December, 1981**
Lichen Looking	
Mystery Marauders	
Sensory Hi-Lo Hunt	
Shake It!	
Snug as a Bug	
Swell Homes	

NIGHTTIME

Night Eyes	**Available**
Night Shine	**August, 1981**
Silent Stalking	
Sound Off!	
The Old White Sheet Trick	
Web It	
Who Goes There?	

OUTDOOR STUDY TECHNIQUES

	Available
Bean Bugs	**December, 1981**
Fly a Leaf	
How Many Organisms Live Here?	
Mapping a Study Site	
Moisture Makers	
Pigment Puzzles	
Plant Patterns	
Shake It!	
Water Snails	
Who Goes There?	

PAVEMENT AND PARKS

Ants	**Available**
Envirolopes	**Now**
Environmental Sun Prints	
For the Birds	
Junk-in-the-Box	
Plant Hunt	
Plants Around a Building	
Sound Off!	

PONDS AND LAKES

Animal Movement in Water	**Available**
Attract a Fish	**June, 1981**
Can Fishing	
Habitats of the Pond	
Too Many Mosquitoes	
Water Breathers	
Water Holes to Mini-Ponds	
What Lives Here?	

SCHOOLYARD

A Better Fly Trap	**Available**
Food Chain Game	**Now**
Invent a Plant	
Metric Capers	
Seed Dispersal	
Sticklers	
Terrestrial Hi-Lo Hunt	

SEASHORE

Animal Movement in Water	**Available**
Beachcombing	**June, 1981**
Hopper Circus	
Salt Water Revival	
Seas in Motion	
Water Breathers	

STREAMS AND RIVERS

Crowded Grab	**Available**
Damsels and Dragons	**December, 1981**
Great Streamboat Race	
Hold It	
OBIS Oil Spill	
Water Snails	
Water Striders	
What Lives Here?	

TRAIL

Cardiac Hill	**Available**
Gaming in the Outdoors	**December, 1981**
Hold a Hill	
Shake It!	
Trail Construction	
Trail Impact Study	

WINTERTIME

Acorns	**Available**
Animal Anti-Freeze	**December, 1981**
Birdfeeder	
Population Game	
Scent Tracking	
Wintergreen	

NOTE: DATES LISTED ARE PROJECTED AVAILABILITY.

APPENDIX F

Formative Evaluation Measures

1. Observer Report Form
2. Teacher Feedback Form
3. Student Attitude Survey Form
4. Lawn Concept Activity - Posttest
5. Directions for Lawn Concept Activity.

OBSERVER REPORT FORM

UNIT ________________________ ACTIVITY ____________________

GROUP ______________________ DATE ________________________

NO. OF PARTICIPANTS __________

PURPOSE OF ACTIVITY:

OBSERVATIONS:

Give approximate time spent on each activity. How are the individuals working (alone, small groups, is there an inseparable clique, etc.)?

Use narrative form interspersed with verbatim interactions when appropriate.

SUMMARY & CONCLUSIONS

Give brief summary of main points, major impact on groups and receptivity of group.

What didn't work?
What worked?
Was the purpose of the activity accomplished?

SUGGESTIONS FOR IMPROVEMENT

What changes, if any, would you make in this activity? In the relationship of this activity to the unit?

Note: Be sure and pick up teacher feedback sheets.

Leader ______________________ Date ____________________

Unit ________________________ Size of Group ____________

Activity ____________________

WHAT WAS YOU OPINION OF THIS ACTIVITY?

We would like your reaction to this activity. Please check the appropriate response.

The students had fun doing this activity.

Yes ____ Yes, but I hoped for more ____ Somewhat ____ No ____

The students learned something worthwhile from this activity.

Yes ____ Yes, but I hoped for more ____ Somewhat ____ No ____

There was too much discussion.

Yes ____ Somewhat ____ No ____

There was a lot of work with materials.

Yes ____ Somewhat ____ No ____

This was a good activity.

Yes ____ Yes, but I hoped for more ____ Somewhat ____ No ____

The activity took too long.

Yes ____ Somewhat ____ No ____

This activity should be changed.

Yes ____ Somewhat ____ No ____

The activity was (circle one): difficult average easy

What is your reaction to the activity? Do you have suggestions for improving the activity?

____

____

____

Leader: ____________________

Date: ____________________

ATTITUDE SURVEY

We plan to make some changes in this course so we would appreciate your opinion.

What did you like least about the unit? ____

____

____

What did you like most about the unit? ____

____

____

	Yes	Somewhat	No
The course was boring.	___	___	___
The leaders were helpful.	___	___	___
The activities were fun.	___	___	___
I liked being outdoors.	___	___	___
The course was too long.	___	___	___
I learned from the class discussions.	___	___	___
I liked the materials.	___	___	___
I learned a lot about this course.	___	___	___
I learned some things I wanted to know.	___	___	___
The class was well organized.	___	___	___

I would recommend this course to a friend (circle one): yes maybe no

I would like to take another course like this: yes maybe no

LAWN CONCEPT ACTIVITY - POSTTEST

Name ____________________

Teacher __________________

Date ____________________

Listen to the OBIS staff member introduce the plants at the front of the room.

1. Look at the plants in the front of your room labeled A, B, and C. For each plant tell whether you think it came from the center of the road and why.

Plant A from the center of the road? Yes _____ No _____

Explain ____

____

Plant B from the center of the road? Yes _____ No _____

Explain ____

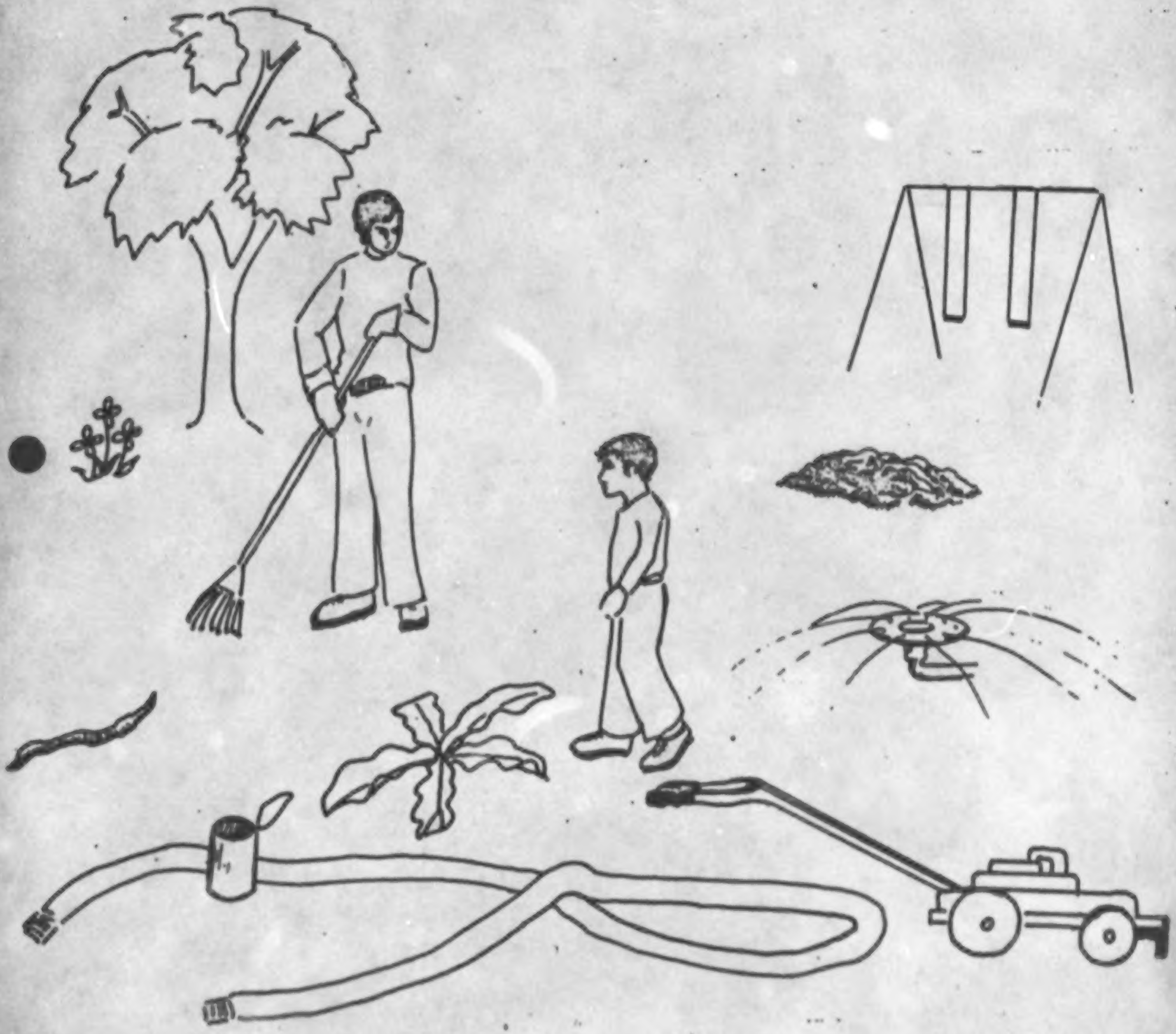
____

Plant C from the center of the road? Yes _____ No _____

Explain ____

____

2. **You and your friend Professor Science are arguing about how to define a lawn. The Professor says all the things in this picture are necessary for a lawn. Put an X over any that you think are unnecessary.**



3. Find your three pictures (They are on a large card).

Record the letter of your first picture here __________
The distribution of the cattle/bushes/trees in the first picture is (circle one): Clumped Random Uniform

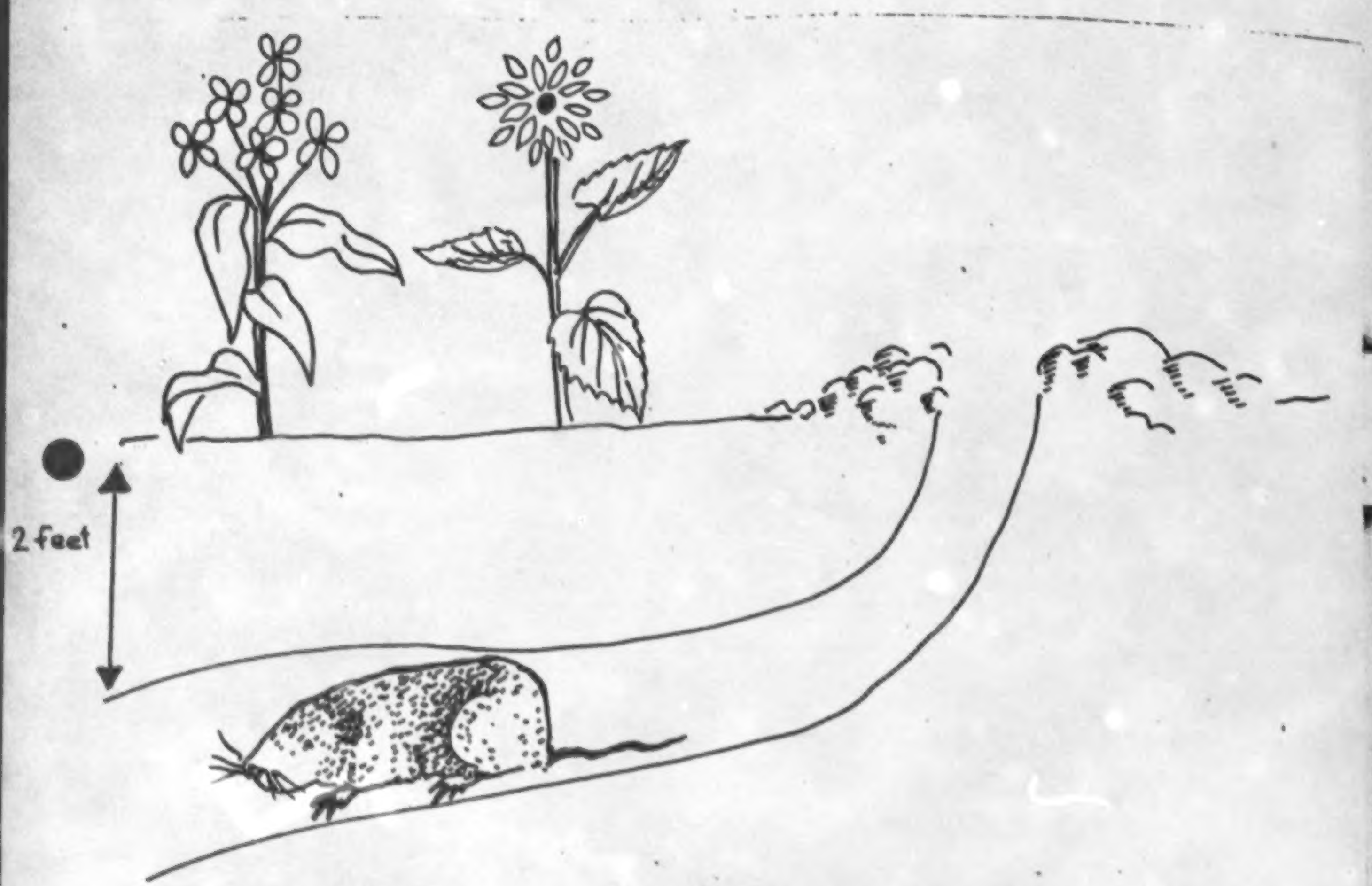
Record the letter of your second picture here __________
The distribution of the cattle/bushes/trees is (fill in) __________

Record the letter of your third picture here __________
The distribution of the cattle/bushes/trees is (fill in) __________

4. List as many different kinds of plants and animals as you can think of that might live on or interact with a lawn.

__________________________ __________________________
__________________________ __________________________
__________________________ __________________________
__________________________ __________________________
__________________________ __________________________
__________________________ __________________________
__________________________ __________________________
__________________________ __________________________
__________________________ __________________________
__________________________ __________________________
__________________________ __________________________
__________________________ __________________________

5. Godfrey Gopher lives in this tunnel. He munches everyday on all the roots of plants that grow into his tunnel. Now for a plant to survive in this neck of the woods it has to have at least 3-1/2 feet of roots. Draw in two different kinds of roots--both of which could survive—for the plants shown below.



6. On the back of your packet is a make believe THICKET. Each piece of yarn represents a single berry plant. Use the one inch square piece of wire to find out how many berry plants there are in the thicket. Hint: The thicket is 10 inches by 10 inches. Please show all your work.

Optional: Your local agriculture-business representative offers you 10 cents per plant for picking the berries. How much money would you get for picking the berries? Is it a rip-off?

Directions for Lawn Concept Activities

Hello. My name is Bob D'Amico, I'm part of a group called OBIS. We are making-up new science activities for students your age. You're going to help us by answering some questions which will let us find out what you think about lawns. (Get someone to pass out tests and materials.) When you receive your papers, please put your name, your teacher's name, and todays date in the spaces at the top left-hand corner of the paper. Once everyone has their papers we'll read over the questions together to be sure you all understand the questions. After that I can only help you read the questions.

(After materials are passed out) These questions are not a test since you won't be graded. Your teacher won't even see the answers you put down. So please just do your own work and answer the questions you can. If you don't know an answer, don't worry about it. Just write "I don't know." and move on to the next question. We'll skip the first question for now, since I'll be giving it to you orally.

(Read over questions and answer students questions about procedures and basic definitions of non-key words.)

Now I'll give you the first question orally. When I'm finished you can continue to answer the rest of the questions at your own speed. And remember you won't be graded on your answers so just relax and please don't ask your friends for help.

The first question: There is a farmer who drives his Chevy sedan over the dirt road to his farmhouse twice every day. His wheels always go in the same ruts in the road. There are some plants growing in the dirt between the two ruts which his wheels go in. There are also plants growing along the side of the road. I dug-up some plants and put them in containers. Here at the front of the room we have three of the plants. We want you to tell us which of these plants you think could have been growing in the dirt road between the ruts made by the wheels of the farmer's car. Look at the plants one-at-a-time and for each plant tell us on your paper that: Yes, you think it could have been growing in the middle of the road; or No, you don't think it could have been. Then explain why you think it could have been or could not have been growing in the road between the two ruts.

(Repeat question 1)

If you have any trouble reading the questions raise your hand and I'll come around to help you.

APPENDIX G

Resource Center Directory

1980 OBIS RESOURCE CENTER DIRECTORS

ALASKA

Gail C. Nichols
Science Department Head
North Pole Jr. Sr. High School
Box #1250
Fairbanks, AK 99701
(907) 488-2271 (Work)

ARIZONA

Mr. Richard Clark
Curriculum Developer Specialist
Washington Elementary Schools
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8610 North 19th Avenue,
Phoenix, AZ 85021
(602) 995-6164

Sister Francois Anderson
Junior High Science Teacher
St. Thomas The Apostle Convent
4550 North 24th Street,
Phoenix, AZ 85016
(602) 8489

ARKANSAS

Joannie Morris, Field Naturalist
Arkansas State Parks
Arkansas Department of Parks &
Tourism - Parks Division
One Capitol Mall,
Little Rock, AR 72201
(501) 371-7670

Dr. Mel Fuller
Department of Science Education
University of Arkansas
33rd. and University,
Little Rock, AR 72204
(501) 569-3149

CALIFORNIA

Mr. J. Grant Gerson, Executive Director
Darrow Milgrim, Director
Calamigos Star C Ranch
327 S. Latigo Canyon Road,
Route 4, Box #140
Malibu, CA 90265
(213) 889-9724 & 889-7919
(213) 873-4754

Mr. John W. Anderson
Executive Director
Sacramento Science Center &
Junior Museum
3615 Auburn Boulevard,
Sacramento, CA 95821
(916) 485-4471

Dr. William C. Ritz
Science Education Coordinator
School of Natural Sciences
California State University
Long Beach, CA 90840
(213) 498-4801

Dr. Sherman Rosenfeld
Executive Director
Discovery Center
1944 North Winery,
Fresno, CA 93703
(209) 251-5531

COLORADO

Betty Fannin
School District No. 20 - Colorado Springs
7015 Switchback Trail
Colorado Springs, CO 80919
(303) 598-1885

1980 OBIS Resource Center Directors - Cont'd: JAN, 1981.

CONNECTICUT

Larry Schaefer
Director
ACES Environmental Education Center
800 Dixwell Avenue,
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(203) 562-9967

DELAWARE

Dr. Les Picker
College of Education
University of Delaware
Newark, DE 19711
(302) 738-2184

FLORIDA

Mr. David LaHart
Director
Environmental Services
4649 S. Friday Circle,
Cocoa, FL 32922
(305) 632-2582

GEORGIA

Ross A. Zito
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